



INSTALLATION, OPERATING AND SERVICE MANUAL

ELECTRONIC TANNIN GUARD SOFTENER WITH THE X-FACTOR DIAMOND LINE CONTROL VALVE

PROGRAMMED FOR PRE-FILL BRINING OPTION

☐ 7-LXTAN-100B



Congratulations on purchasing your new **Lancaster Water Softener plus Tannins, Organics and Color Removal System**. This unit is designed to give you many years of trouble-free service. When installed in accordance with the following instructions and if given reasonable care, clear-soft water will be the result. For servicing and future inspection purposes, please file this booklet with your important documents.

If you need assistance with servicing your Water Softener + TOC Removal System, please first contact the professional contractor who installed the system.

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JOB SPECIFICATIONS

MODEL NO. _____

INSTALLATION DATE _____

SERIAL NUMBER _____

INSTALLER NAME _____ PHONE _____

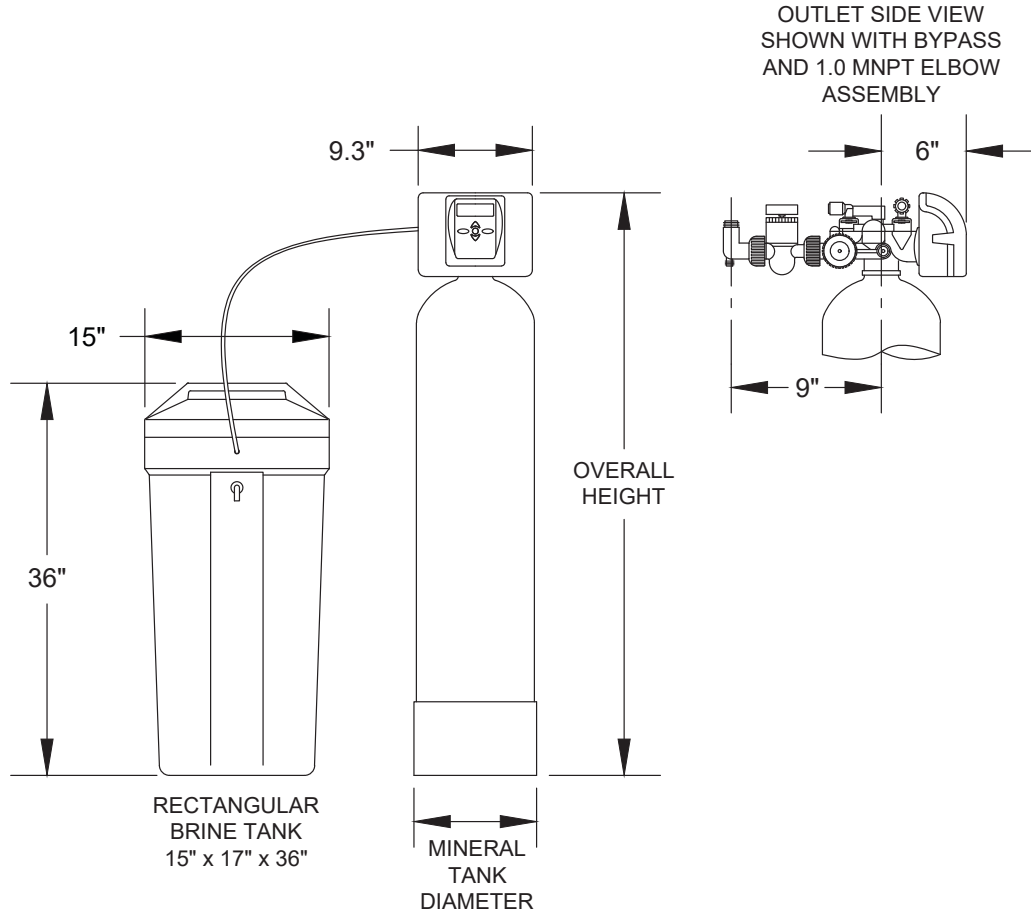
ADDRESS _____

WATER TEST AT TIME OF INSTALLATION

- _____ **Hardness** measured in grains per gallon (gpg) as CaCO₃
- _____ **Tannins** measured in parts per million (ppm) or equivalent mg/L (1 ppm = 1 mg/L)
- _____ **Iron** measured in parts per million (ppm) or equivalent mg/L (1 ppm = 1 mg/L)
- ☐ Ferrous iron, a.k.a. clear-water iron, is soluble (fully dissolved) in water, i.e. tap water is clear when first drawn.
- ☐ Ferric iron, a.k.a. red-water iron, is insoluble, i.e. tap water is already discolored orange, red or brown when drawn because the iron has already oxidized; remove using pre-filtration.
- _____ **Manganese** measured in parts per million (ppm) or equivalent mg/L
- ☐ Manganous manganese is soluble (fully dissolved) in water, i.e. tap water is clear when first drawn.
- ☐ Manganic manganese is insoluble, i.e. tap water is already discolored brown, gray, or black when drawn because the manganese has already oxidized; remove using pre-filtration.
- _____ **pH** the pH scale ranges from 0 to 14; 7 is neutral, < 7 is acidic, > 7 is alkaline (or basic).
- _____ **Total Dissolved Solids (TDS)** measured in parts per million (ppm) or equivalent mg/L

SYSTEM SPECIFICATIONS

READ ALL INFORMATION IN THIS SECTION TO CONFIRM APPLICATION COMPATIBILITY



LXTAN PROGRAM CYCLES ¹	WATER AVAILABLE TO SERVICE DURING REGENERATION	WATER SOFTENER & TANNINS, ORGANICS AND COLOR REMOVAL	
Model Number		7-LXTAN-100B	
		Minutes	Gallons
1st: Fill -Treated Water into Brine Tank (Programmed in LBS Salt)	Treated Water	5.33	2.67
		8.0 LBS	
2nd: Softening (Minutes)	Treated Water	240	0
3rd: Backwash (Minutes)	Untreated Water	10	17
4th: Regenerant Draw DN & Slow Rinse (Minutes)	Untreated Water	50	18.5
5th: Air Release (90 seconds)	Untreated Water	1.5	2.55
6th: Backwash (Minutes)	Untreated Water	10	17
7th: Rinse (Minutes)	Untreated Water	5	8.5
8th: End	-	-	
DLFC - Drain Line Flow Control (GPM)	-	1.7	
Total Gallons to Drain ²	-	66.22	
Total Regeneration (Minutes)	-	321.83	
Total Time Untreated Water is Available to Service During Regeneration (Minutes)	-	76.50	

¹ Downflow Regenerant, Prefill Factory Program Settings , Demand Initiated Regeneration (DIR) with 4 Day Override.

² Based on 50 PSI Inlet Pressure.

LXTAN SPECIFICATIONS	WATER SOFTENER & TANNINS, ORGANICS AND COLOR REMOVAL
Model Number	7-LXTAN-100B
Inlet/Outlet Fitting Options (Inches) ¹	0.75 - 1.0 ¹ - 1.25 - 1.5
Bypass Included	Yes
Drain Fitting Elbow NPT or OD Poly Tube Size (Inches)	3/4 NPT or 5/8 Tube
Water Pressure Range (PSI)	20 - 100 PSI
Water Operating Temperature Range (°F)	35 - 100 °F
Influent Maximum Water Hardness (GPG)	100 GPG
Influent Maximum Ferrous Iron (PPM) ²	0.5 PPM
Influent Maximum Tannins (PPM) ⁴	3.0 PPM
Plug-In Power Adapter Input (VAC - Hz - A)	120V AC - 60 Hz - 0.35 A
Plug-In Power Adapter Output (VDC - A)	15V DC - 0.5 A
Plug-In Power Adapter Cord Length (FT)	15 FT
PC Board Relay Terminal Block DC Output (V)	12V DC
3 Volt Pre-Installed Lithium Coin Cell Battery (Type)	CR2032
Recommended Service Flow Rate Range (GPM)	1 to 5 GPM
Service Flow Rate at 15 PSI Pressure Drop (GPM) ³	14 GPM
Overall Height (Inches)	67.6
Mineral Tank Size: Diameter x Height (Inches)	10" x 60"
Mineral Tank Dome Hole Plug	No
Distributor Type	Mid-Plate & Bottom Plate
Top Basket Distributor	Yes
Top Deflector	No
Cubic Feet of TOC/Tannin Removal ⁴ Anion Resin in Bottom Chamber (LBS)	0.5 (22 LBS)
Cubic Feet of Water Softener Cation Resin in Top Chamber (LBS)	1.0 (52 LBS)
Brine Tank Size (Inches) ⁵	15 x 17 x 36
Brine Tank Capacity (LBS Salt)	275 LBS Salt
DLFC - Drain Line Flow Control (GPM)	1.7 GPM
RFC - Brine Line (Re-Fill) Flow Control (GPM)	0.5 GPM
Injector Size (Color)	1E - White
Softener Grains Capacity (Grains @ LBS Salt) ⁶	24,000 @ 8.0
Water to Drain at 50 PSI Inlet Pressure (Gallons)	66.22

¹1.0 MNPT Elbow Standard - Options Available

²Ferrous iron ("clear-water iron"): Water comes out of the faucet clear, but turns red or brown after standing. Ferrous iron less than 0.3 ppm (mg/L) will not cause staining. Higher ferrous iron levels will require iron pre-filtration. Ferric iron is insoluble and should be removed by pre-filtration.

³Flow rate shown at 15 PSI pressure drop exceeds resin manufacturer's recommended maximum flow rates. Selecting a system by pressure drop alone does not guarantee that the system will provide softened water and effectively remove tannins.

⁴Tannins are naturally occurring organic material, byproducts of fermentation, i.e. created as water passes through peaty soil and decaying vegetation. Tannins can cause water to have anywhere from a faint yellow to brown tea-like color, causing staining. A tannin concentration of 0.5 ppm is typically considered the minimum threshold for requiring treatment due to staining. This residential system is designed to treat tannin concentrations in the 0.5 to 3.0 ppm range.

The amount of tannin removal resin used is particularly effective in removing the lighter yellow to medium tea-colored staining variety of tannins. The tannin removal resin located in the tank's lower chamber is a strong base anion resin with larger pores (macroporous), specifically designed for tannin removal. Tannins are removed by ion exchange as well as absorption. When tannins are exchanged onto the anion resin, they will tend to travel into the middle of the resin bead. This movement makes tannins very difficult to remove from the resin bead during regeneration. For this reason, frequent regeneration is required to reduce the potential for fouling. The day override is factory set to 4; it is not recommended to increase this setting. If staining persists, reduce the day override setting to 2 or 3 days.

The amount of tannin removal resin used in this system has an organic capacity of approximately 1,000 ppm-gallons.

If the water has a tannin concentration as low as 0.5 ppm ...

$1,000 \text{ ppm gallons} / 0.5 \text{ ppm} = 2,000 \text{ gallons}$, i.e. 2,000 gallons can be treated between regenerations; we recommend no more than 4 days between regenerations.

If the water has a tannin concentration as high as 3.0 ppm ...

$1,000 \text{ ppm gallons} / 3.0 \text{ ppm} = 333 \text{ gallons}$, i.e. 333 gallons can be treated between regenerations.

A mild phosphoric acid-based resin cleaner can be used during the regeneration process, e.g. Res-Up liquid phosphoric acid mixture and automatic feeder system. Res-Up is less likely to damage the resin when applied according to instructions. Res-Up works in conjunction with the brine draw regeneration cycle, cleaning contaminants off the resin beads, then backwashed and rinsed to drain. Oxidants should be removed from the water prior to this system. Carbon pre-filtration for the removal of chlorine and chloramines will increase the life expectancy of the softener resin and tannin resin, as well as reduce the potential for persistent fishy odor often associated with tannin resin degradation due to chemical oxidants. Trihalomethanes (THMs) that may form from a chemical reaction between tannins and chlorine can also be removed by carbon.

⁵See Diagram

⁶Factory Program Setting

PRE-INSTALLATION REVIEW

WATER QUALITY: If sand or sediment is present in the water supply, a sediment filter should be installed ahead of the water conditioner. Your water conditioner has been designed to adequately reduce hardness from levels up to 100 grains per gallon and tannins from levels up to 3.0 ppm; refer to the system specifications section. In some cases, additional treatment equipment may be needed to treat water having special characteristics, such as: iron, iron bacteria, low pH, tastes and odors, etc. Consult your dealer if you have any questions. **This water conditioner is not to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after treatment.**

WATER PRESSURE: A minimum of 20 pounds of water pressure (psi) is required for regeneration. Maximum 100 psi. **CAUTION:** the conditioner cannot be subject to a vacuum due to loss of pressure (such as a water main break or submersible well pump check valve failure). If the possibility of a vacuum could occur, install a vacuum breaker on the cold water inlet line leading to the water conditioner, positioned as close to the unit's vessel as possible.

WATER TEMPERATURE: The range of water temperature is 35°F to 100°F. **DO NOT** install any water conditioner with less than 10 feet of piping between its outlet and the inlet of a water heater. **CAUTION:** the use of a thermal expansion tank might be required to protect the conditioner in the event of a hot water heater backup. Refer to installation diagrams.

AMBIENT TEMPERATURE: **DO NOT** locate conditioner where it or its connections (including the drain and overflow lines) will ever be subject to room temperatures under 33°F.

ELECTRICITY: An uninterrupted 120 volt 60Hz source is required. *Make sure electrical source is not on a timer or switch.* All electrical connections must be connected according to local codes. The plug-in power adapter is for dry locations only. Surge protection is recommended with all electrical connections.

DRAIN: All plumbing should be done in accordance with local plumbing codes. The distance between the drain and the water conditioner should be as short as possible. The pipe size for the drain line should be a minimum of 1/2" (inside diameter of pipe). Avoid overhead drain lines if possible to prevent backpressure on the system. Refer to installation diagrams for drain line pipe size recommendation.

SOFTENING: It is recommended that the conditioner be installed to soften both the hot and cold water supply. Outside faucets should be left on hard water.

BYPASS: A bypass valve (included) should be installed so that water will be available if it should be necessary to shut off the pressure in order to service the conditioner.

GENERAL INSTALLATION AND SERVICE WARNINGS

The control valve, fitting assemblies and bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary. **Avoid any type of lubricants, including silicone, on the clear lip seals.**

The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench (V3193). If necessary, pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screw driver in the slots on caps and/or tap with a hammer.

Do not use pipe dope or other sealants on threads. Use Teflon tape on the threaded inlet, outlet and drain fittings. Teflon tape is not necessary on the nut connection or caps because of o-rings seals.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" between the drain line control fitting and solder joints when soldering pipes that are connected on the drain line control fitting. Failure to do this could cause interior damage to the drain line flow control fitting.

When assembling the installation fitting package (inlet and outlet), connect the fitting to the plumbing system first and then attach the nut, split ring and o-ring. Heat from soldering or solvent cements may damage the nut, split ring or o-ring. Solder joints should be cool and solvent cements should be set before installing the nut, split ring and o-ring. Avoid getting primer and solvent cement on any part of the o-ring, split rings, bypass valve or control valve.

Install grounding strap on metal pipes. If the building's plumbing is metal (e.g. copper) and building's electrical system is grounded to the plumbing, install a copper grounding strap from the conditioner inlet pipe to the conditioner outlet pipe.

This water conditioner is not to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after treatment.

BYPASS VALVE

The bypass valve is typically used to isolate the control valve from the plumbing system's water pressure in order to perform control valve repairs or maintenance. The X-Factor bypass valve is particularly unique in the water treatment industry due to its versatility and state of the art design features. The 1" full flow bypass valve incorporates four positions, including a diagnostic position that allows service personal to work on a pressurized system while still providing untreated bypassed water to the facility or residence. Its completely non-metallic, all-plastic design allows for easy access and serviceability without the need for tools.

The bypass body and rotors are glass filled Noryl® (or equivalent) and the nuts and caps are glass filled polypropylene. All seals are self-lubricating EPDM to help prevent valve seizing after long periods of non-use. Internal o-rings can easily be replaced if service is required.

The bypass consists of two interchangeable plug valves that are operated independently by red arrow-shaped handles. The handles identify the flow direction of the water. The plug valves enable the bypass valve to operate in four positions.

OPERATION:

1. Normal Operation Position: The inlet and outlet handles point in the direction of flow indicated by the engraved arrows on the control valve. Water flows through the control valve during normal operation. During the regeneration cycle, this position allows the control valve to provide water for regeneration while also providing untreated water to the building plumbing system. (see figure 1)

2. Bypass Position: The inlet and outlet handles point to the center of the bypass, the control valve is isolated from the water pressure contained in the plumbing system. Untreated water is supplied to the plumbing system. (see figure 2)

3. Diagnostic Position: The inlet handle points in the direction of flow and the outlet handle points to the center of bypass valve, system water pressure is allowed to the control valve and the plumbing system while not allowing water to exit from the control valve to the plumbing. (see figure 3)

4. Shut Off Position: The inlet handle points to the center of the bypass valve and the outlet handle points in the direction of flow, the water is shut off to the plumbing system. The softener will depressurize upon opening a tap in the building. If water is available on the outlet side of the softener it is an indication of water bypass around the system (i.e. a plumbing connection somewhere in the building bypasses the system). (see figure 4)

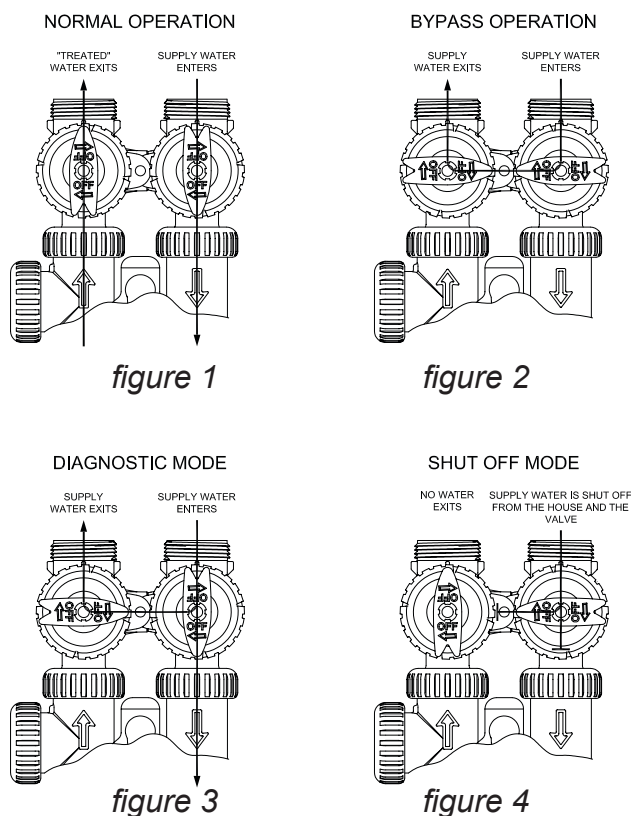
The working parts of the bypass valve are the rotor assemblies that are contained under the bypass valve caps. Before working on the rotors, make sure the system is depressurized. Turn the red arrow shaped handles towards the center of the bypass valve and back several times to ensure rotor is turning freely.

The nuts and caps are designed to be unscrewed or tightened by hand. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place screwdriver in slots on caps and/or tap with a hammer. Refer to page 23 for bypass valve parts diagram and service spanner wrench information. To access the rotor, unscrew the cap and lift the cap, rotor and handle out as one unit. Twisting the unit as you pull it out will help to remove it more easily. There are three o-rings: one under the rotor cap, one on the rotor stem and the rotor seal. Replace worn o-rings. Clean rotor. Reinstall rotor.

When reinstalling the red arrow handles be sure that:

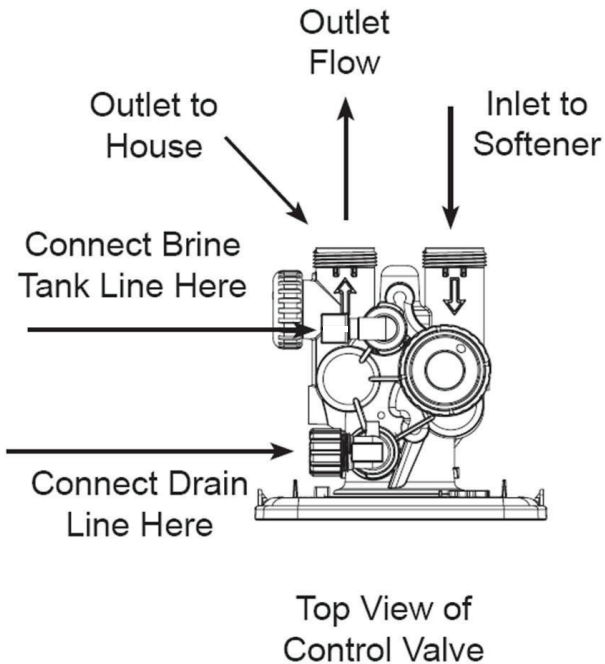
1. The handle pointers are lined up with the control valve body arrows, and the rotor seal o-ring and retainer on both rotors face to the right when being viewed from the front of the control valve; or
2. Arrows point toward each other in the bypass position.

Since the handles can be pulled off, they could be accidentally reinstalled 180° from their correct orientation. To install the red arrow handles correctly, keep the handles pointed in the same direction as the arrows engraved on the control valve body while tightening the bypass valve caps.



INSTALLATION INSTRUCTIONS

(All electrical & plumbing should be done in accordance to all local codes)



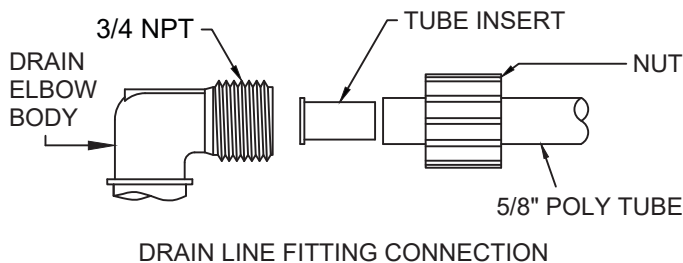
1. Place the softener where you want to install it, making sure it is on a clean, level and firm base.

2. Do all necessary plumbing (inlet to inlet, outlet to outlet, and drain line to drain). The control valve, fittings and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

3. When assembling the installation fitting package (inlet and outlet), connect the fitting to the plumbing system first and then attach the nut, split ring and o-ring. Heat from soldering or solvent cements may damage the nut, split ring or o-ring. Solder joint should be cool and solvent cements should be set before installing the nut, split ring and o-ring. Avoid getting primer and solvent cement on any part of the o-rings, split rings, bypass valve or control valve.

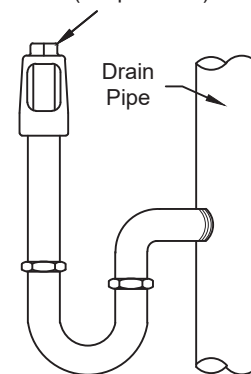
4. A jumper ground wire should be installed between the inlet and outlet pipe whenever the metallic continuity of a water distribution piping system is interrupted. Install grounding strap on metal pipes.

5. The drain connection may be made using either 5/8" polytube (see below) or a 3/4" female adapter. The polytube insert is shipped attached to the drain line elbow's locking clip. Press the insert into the drain line tubing (tubing not provided). Loosen the nut of the drain line elbow. Press the 5/8" polytube with insert into the drain line elbow until it seats on the back of the fitting. Tighten the nut. If soldering, joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" between the drain line control fitting and solder joints when soldering pipes that are connected on the drain line control fitting. Failure to do this could cause interior damage to the drain line flow control fitting. Never insert a drain line into a drain, sewer line, or trap. Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into the softener.



Example of an air-gap set-up

G-175 AIR GAP FITTING
1-1/2" Solvent x 3/4" FPT
(not provided)

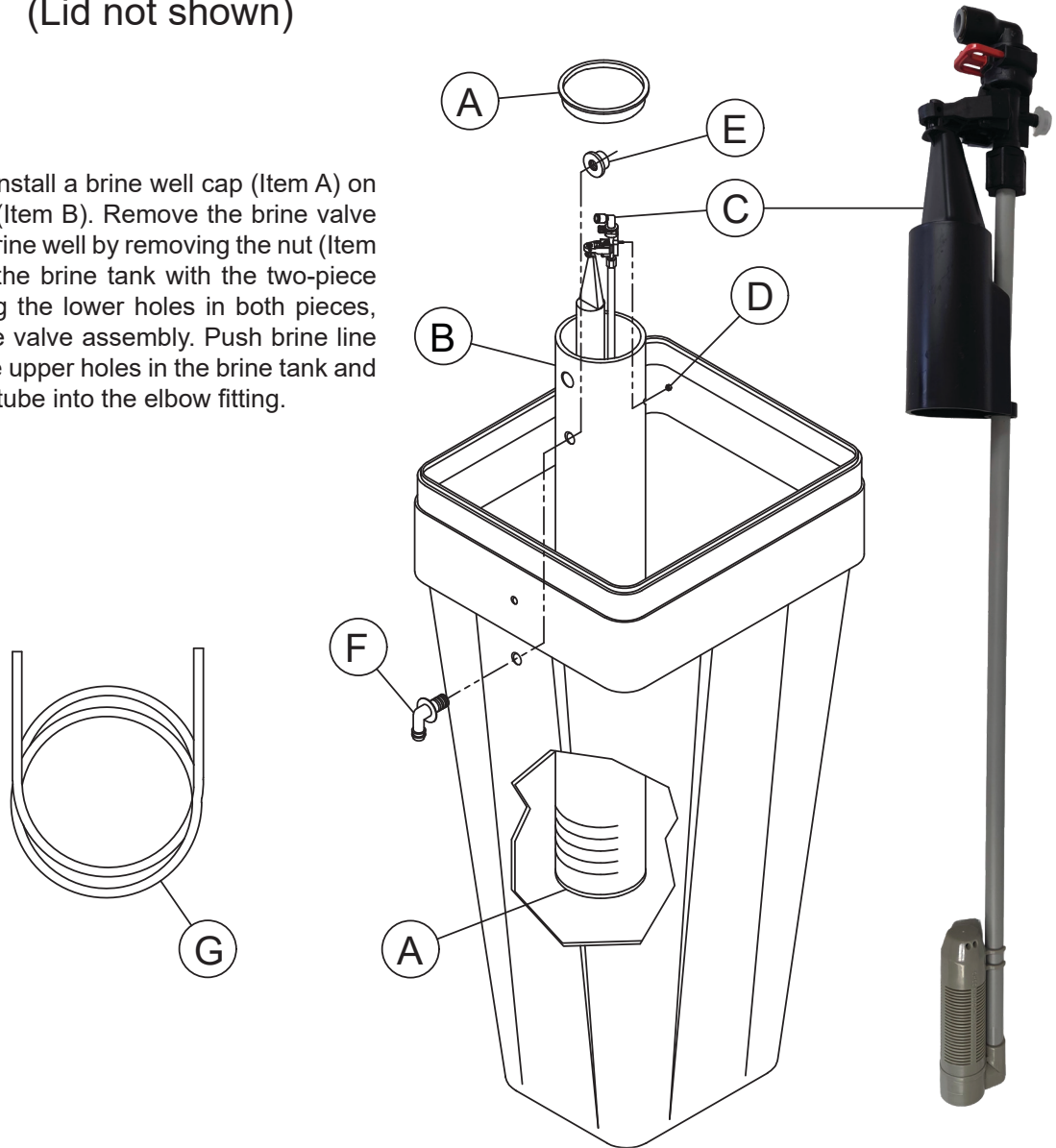


INSTALLATION INSTRUCTIONS CONT'D

(All electrical & plumbing should be done in accordance to all local codes)

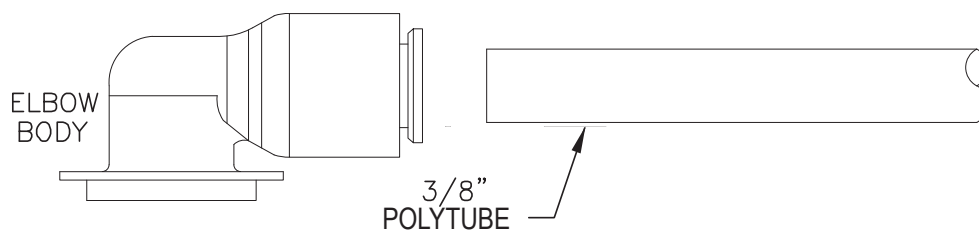
Brine Tank Exploded View (Lid not shown)

6. Assemble the brine tank. Install a brine well cap (Item A) on the bottom of the brine well (Item B). Remove the brine valve assembly (Item C) from the brine well by removing the nut (Item D). Attach the brine well to the brine tank with the two-piece overflow (Items E & F) using the lower holes in both pieces, as shown. Reinstall the brine valve assembly. Push brine line polytube (Item G) through the upper holes in the brine tank and brine well and press the polytube into the elbow fitting.



7. The brine refill flow control assembly is installed in an easy to access refill elbow located on top of the control valve. The refill flow control assembly is attached to the control valve with a locking clip. The locking clip allows the elbow to rotate 270 degrees so the outlet can be oriented towards the brine tank.

8. Connect the brine line polytubing found with the brine tank to the brine connection on the control valve. The control valve has a standard refill elbow to which a 3/8" flexible tube can be connected, see below. Press the polytube into the brine elbow fitting. Make sure the floor is clean beneath the brine tank and that it is level and smooth.

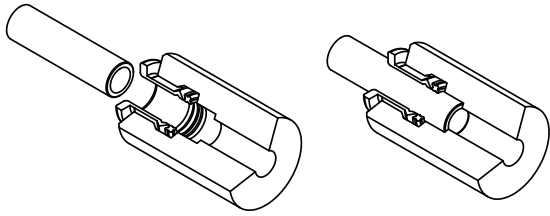


BRINE LINE FITTING CONNECTIONS

INSTALLATION INSTRUCTIONS CONT'D

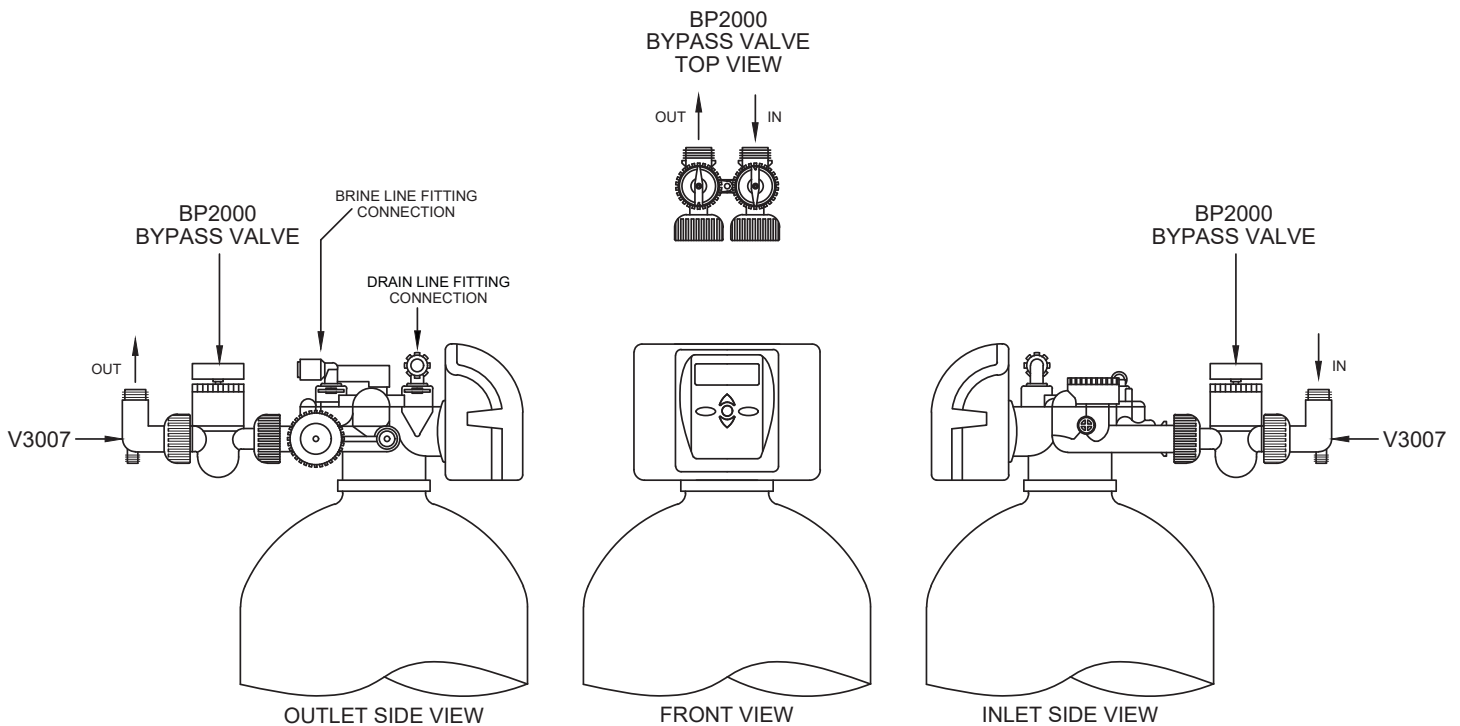
(All electrical & plumbing should be done in accordance to all local codes)

Connecting Brine Line Polytube to Brine QC Fitting Instructions



1. Carefully trim tubing to length. Be sure tubing is free of debris, nicks or scratches which may cause fittings to leak past the quad seal.
2. Firmly insert the tubing into the fitting. Be certain tubing goes past the quad seal and properly bottoms in fitting (see diagrams). The fitting will grab the tubing and hold and seal it in place.
3. To remove the tubing, push the collet around the tubing in and at the same time pull the tubing out.

LXTAN MULTI-VIEW PERSPECTIVE

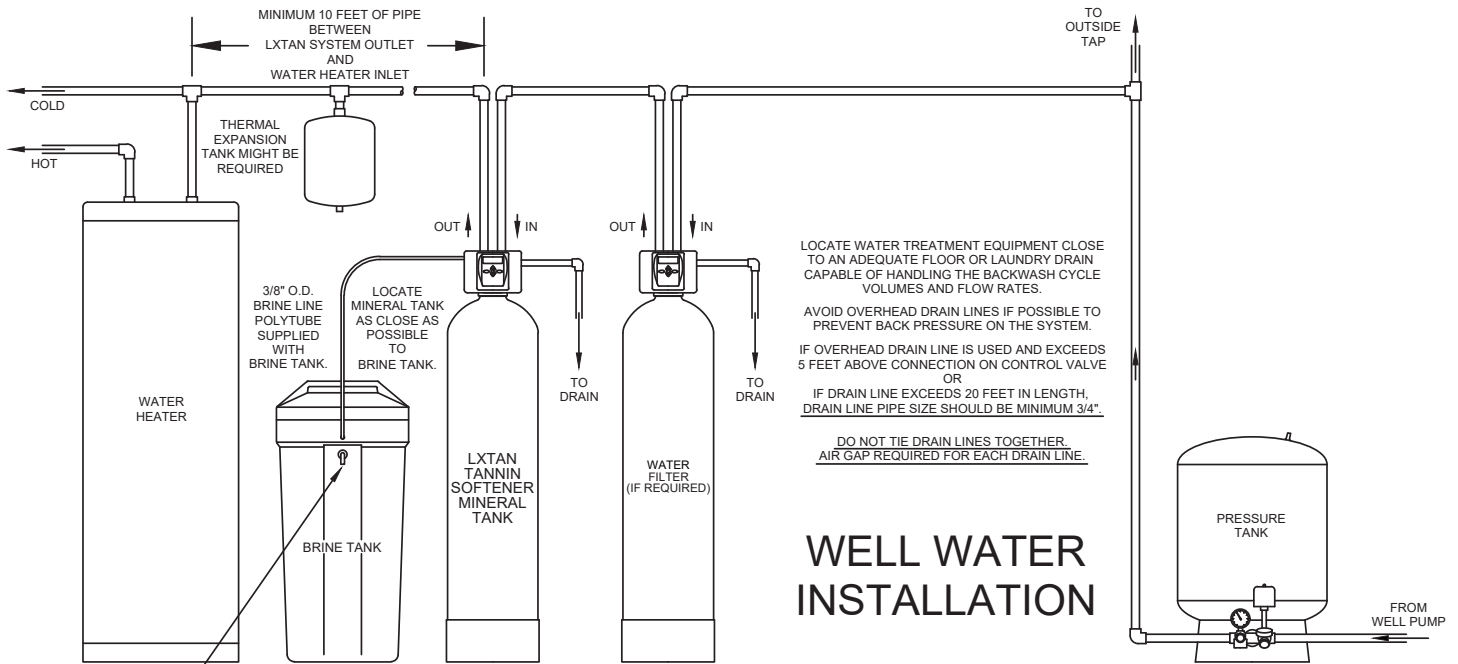


9. A 1/2" (inside diameter, not provided) gravity drain line should be connected to the overflow fitting on the side of the brine tank. This overflow is in case of a malfunction in the brine shut off. If the unit is installed where water may flow in the event of an overflow and cause water damage, connect a length of flexible tubing and run to a drain below the level of the overflow. **(Do not connect the tubing to the drain line on the control valve. Do not run tubing above overflow height at any point.)**

See Installation Diagrams on next page.

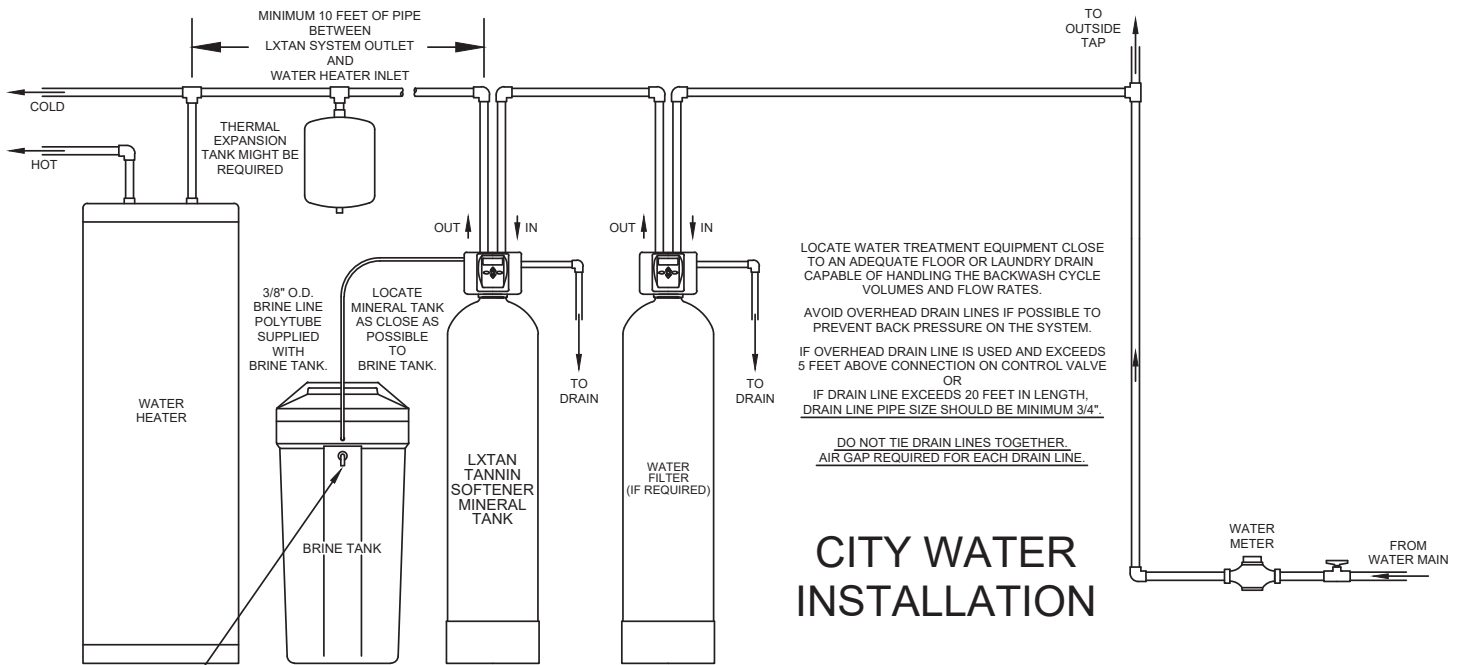
INSTALLATION INSTRUCTIONS CONT'D

(All electrical & plumbing should be done in accordance to all local codes)



WELL WATER INSTALLATION

OVERFLOW GRAVITY DRAIN - ONLY USED IN CASE OF MALFUNCTION IN THE BRINE SHUTOFF. DO NOT CONNECT TO CONTROL VALVE DRAIN LINE. IF UNIT IS INSTALLED WHERE OVERFLOW COULD CAUSE WATER DAMAGE, CONNECT TUBING AND RUN TO FLOOR DRAIN. DO NOT RUN TUBING ABOVE OVERFLOW HEIGHT.



CITY WATER INSTALLATION

OVERFLOW GRAVITY DRAIN - ONLY USED IN CASE OF MALFUNCTION IN THE BRINE SHUTOFF. DO NOT CONNECT TO CONTROL VALVE DRAIN LINE. IF UNIT IS INSTALLED WHERE OVERFLOW COULD CAUSE WATER DAMAGE, CONNECT TUBING AND RUN TO FLOOR DRAIN. DO NOT RUN TUBING ABOVE OVERFLOW HEIGHT.

PLACING THE TANNIN SOFTENER INTO SERVICE

Do not add salt to the brine tank yet. Do not plug the transformer into the receptacle yet. Rotate the bypass handles to the **BYPASS** position (see figure 2 on page 7). Turn on main water supply. Open a cold water faucet. This will clear the line of any debris that may be in the line. Let water run at faucet for a couple minutes, or until clear. Turn off faucet. Manually add 1 ½ gallons of water to the brine tank. Now plug the transformer into a 120 volt receptacle (be certain the receptacle is uninterrupted). Within 5 seconds the control display and buttons will illuminate and the time of day screen will appear.

- Press and hold the  button for approximately 5 seconds until the motor starts. The display will change color, from **SOLID BLUE** to **SOLID GREEN**.
- Wait until display reads **FILL**, the motor stops and numbers start counting down.
- Momentarily press  again. Wait for the motor to stop and numbers start counting down. Control Valve is now in the **SOFTENING** position.
- Momentarily press  again. Wait for the motor to stop and numbers start counting down. Control Valve is now in the **BACKWASH** position.
- Momentarily press  again. Wait for the motor to stop and numbers start counting down. Control Valve is now in the **REGENERANT DRAW** position.
- Momentarily press  again. Wait for the motor to stop and numbers start counting down. Control Valve is now in the **AIR RELEASE** position.
- Momentarily press  again. Wait for the motor to stop and numbers start counting down. Control Valve is now in the second **BACKWASH** position.

SLOWLY turn bypass valve to **DIAGNOSTIC** position (See figure 3 on page 7) to allow water to slowly enter the Tannin Softener in order to expel air.

When water is flowing steadily to drain without the presence of air, momentarily press  again. The control valve will advance to the **RINSE** position. Change the bypass handles position to **NORMAL OPERATION MODE** (see figure 1 on page 7). Allow control to finish the **RINSE** cycle. Allow the control to automatically advance to the **SOFTENING** position. Now load the brine tank with salt. Solar Salt is recommended. The brine tank salt level should be checked every couple of weeks to determine salt usage. Keeping the brine tank salt level at least 1/2 full is recommended.

SANITIZING: Use 2 oz. of 5 ¼% unscented household chlorine bleach for each cubic foot of resin. Pour bleach directly into the 4" diameter white brine well located inside the brine tank. Press and hold the  for 5 - 6 seconds until the motor starts running. Allow system to complete the regeneration automatically. Check for other local and state codes which may also specify sanitation methods.

Note: *The first step of the regeneration process is to fill the brine tank with the proper amount of water. The brine tank will only have a very slight amount of water in it after the regeneration cycles are completed.*

GENERAL OPERATION

Note: As an energy saving feature, the control will automatically turn off all SOLID BLUE or SOLID GREEN display illumination and keypad illumination after about 5 minutes of the last keypad button push. Any further keypad touch will cause the re-illumination of the display and keypad, and re-activate keypad control.

User Displays

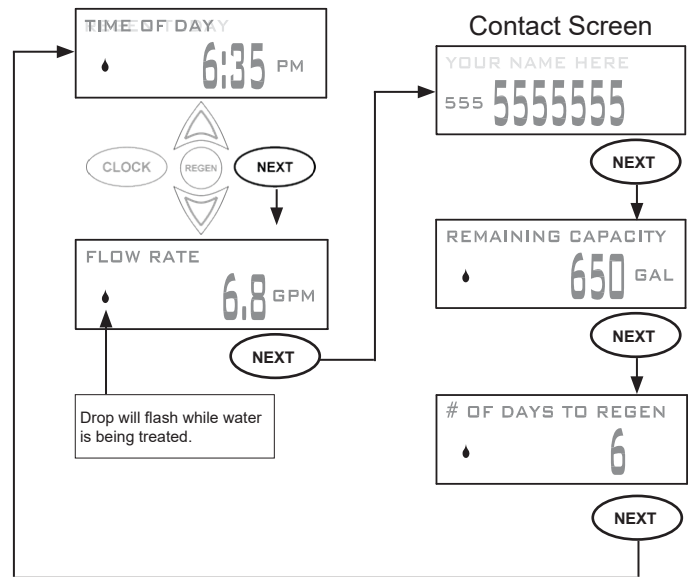
When the system is in normal service mode, one of up to five available User Displays will be shown. Pressing **NEXT** will alternate between the following displays:

- Current time of day
- Treated water flow rate
- Service contact name and phone number (if entered)
- Remaining Capacity of treated water available
- Remaining days to regeneration (if Day Override is programmed)

Pressing the  button while in the Capacity Remaining or Days Remaining displays will decrease the capacity remaining in ten gallon increments or the days remaining in one day increments. Pressing the UP button will **NOT** increase Capacity Remaining or Days Remaining. After a regeneration has fully completed, these values will reset based on original factory programming.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will alternate with the header on the display.

Utilizing the control valve's built-in water meter, a water drop flashes on the display when water is being treated (i.e. water is flowing through the system).



Regeneration Mode

Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used. Factory preset delayed regeneration time: 2:00 AM.

When the system begins to regenerate, the display will change to SOLID GREEN when illuminated, and include information about the step of the regeneration process and the time remaining for that step to be completed. The current cycle display will alternate with the regen time remaining screen. The system runs through the steps automatically and will reset itself to provide treated water when the regeneration has been completed.

Manual Regeneration

Sometimes there is a need to regenerate the system sooner than when the system calls for it, usually referred to as manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

To initiate a manual regeneration **at the preset delayed regeneration time**, press and release **REGEN**. The words "REGEN TODAY" will periodically be shown on the display to indicate that the system will regenerate at the preset delayed regeneration time. If you pressed the **REGEN** button in error, pressing the button again will cancel the request.

To initiate a manual regeneration **immediately**, press and hold the **REGEN** button for three seconds. The system will begin to regenerate immediately. The request cannot be cancelled.

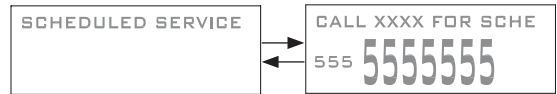
Sometimes it is desirable to have the valve initiate and complete two regenerations within 24 hours and then return to the preset regeneration procedure. To do a double regeneration:

1. Press the **REGEN** button once. REGEN TODAY will flash on the display.
2. Press and hold the **REGEN** button for three seconds until the valve regeneration initiates.

Once the valve has completed the immediate regeneration, the valve will regenerate one more time at the preset regeneration time.

GENERAL OPERATION CONT'D

Service Call Reminder: An illuminated FLASHING YELLOW display and scrolling message to call contact name (if entered) for scheduled service. To clear the Service Call Reminder, press  and  buttons simultaneously for > 3 seconds while the banner text screen is displayed.



Service Call Reminder is available but not programmed ON for this model at the factory.

Error Message: If the valve is not able to function properly, the display will illuminate FLASHING RED, the word "ERROR" and an error code number will display. If a contact name and phone number were input, this information will alternate with the ERROR display. Contact the name on the display, the professional contractor or our factory for help.

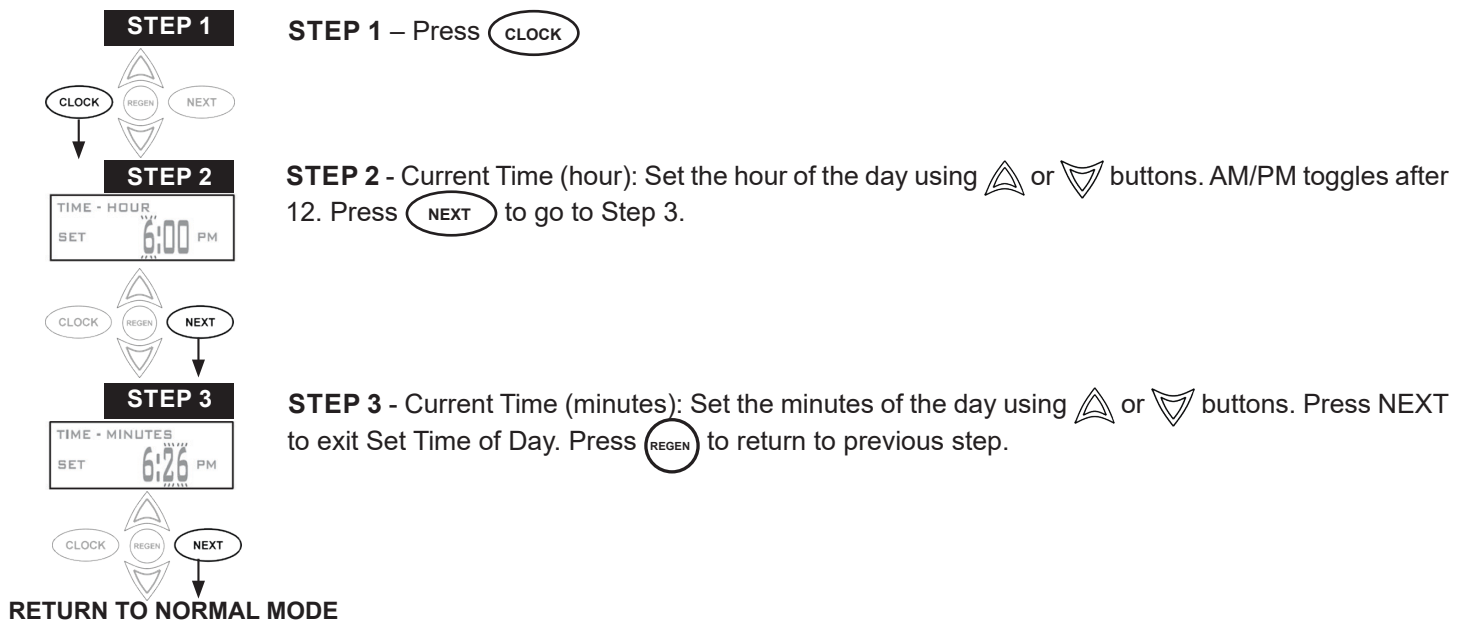


Low Battery: A non-rechargeable 3 volt lithium coin cell battery type 2032 is located on the circuit board (see diagram on page 19) used only to maintain the time of day during power outages (all other information will be stored in memory no matter how long the power outage). The screen displays LOW BATTERY when the battery needs to be replaced. The screen will remain illuminated SOLID BLUE when LOW BATTERY is displayed. Initially LOW BATTERY display will alternate with the User display, finally displaying only LOW BATTERY. User displays are still accessible by pressing .

To replace with new battery, unplug the control valve transformer from the 120 volt receptacle first. Install new battery and then plug transformer back into the receptacle to restore power. **It is important to replace the battery with the control valve unplugged to prevent the possibility of causing a short and damaging the PC Board.**

SET TIME OF DAY

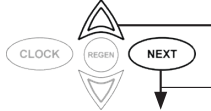
Current time of day needs to be entered during initial installation, and adjusted when daylight saving time begins or ends. If an extended power outage occurs and depletes the on-board non-rechargeable coin cell battery, when power resumes the time of day should be reset and battery replaced.



ADJUST HARDNESS, DAYS BETWEEN REGENERATIONS, OR TIME OF REGENERATION

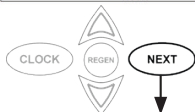
STEP 1

STEP 1 - Press **NEXT** and  simultaneously for 3 seconds to access Installer Display Settings.



STEP 2

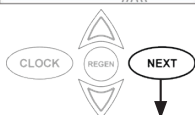
STEP 2 – Hardness: Set the amount of hardness in grains, typically expressed on a water analysis report in grains per gallon (gpg) as CaCO₃. Use the  or  buttons to set the hardness number. The default is 20 with value ranges from 1 to 150 in 1 grain increments. Press **NEXT** to go to step 3. Press **REGEN** to exit Installer Display Settings.



STEP 3

STEP 3 – Day Override: Set the maximum number of days between regenerations. If value set to “OFF”, regeneration initiation is based solely on volume used. If value is set as a number (allowable range from 1 to 28) a regeneration initiation will be called for on that day even if sufficient volume of water were not used to call for a regeneration. Regeneration frequency should not exceed 4 days (factory setting) when tannins are present. Higher amounts of tannins will require more frequent regenerations. Set Day Override using  or  buttons:

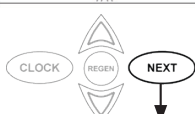
- number of days between regeneration (1 to 28); or
- “OFF”.



Press **NEXT** to go to step 4. Press **REGEN** to return to previous step.

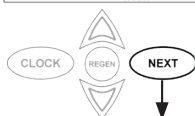
STEP 4

STEP 4 – Next Regeneration Time (hour): Set the hour of day for regeneration using  or  buttons. AM/PM toggles after 12. The default time is 2:00 AM. Press **NEXT** to go to Step 5. Press **REGEN** to return to previous step.



STEP 5

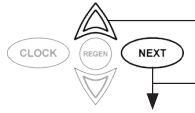
STEP 5 – Next Regeneration Time (minutes): Set the minutes of day for regeneration using  or  buttons. Press **NEXT** to return to normal operation. Press **REGEN** to return to previous step.



RETURN TO NORMAL MODE

CONTACT SCREEN PROGRAMMING

STEP 1



STEP 1 - Press **NEXT** and  simultaneously for 3 seconds to access Installer Display Settings.

STEP 2



STEP 2 - Press **NEXT** to go to step 3.

STEP 3

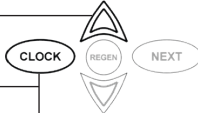


STEP 3 - Press **NEXT** to go to step 4.

STEP 4



From Step 4, while hour is flashing, press and hold both the **CLOCK** and  button to change phone number and banner text.

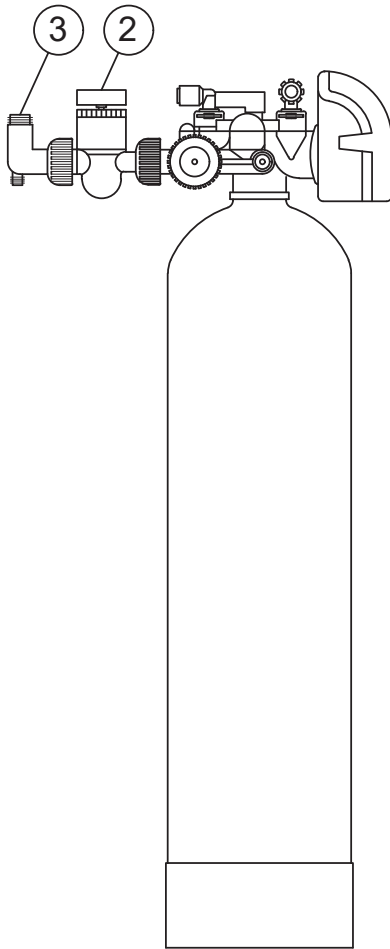
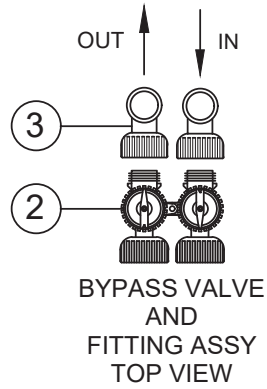


Phone Number - Set phone number using the  or  arrow. Press **NEXT** to forward to the next digit. Press **REGEN** to return to previous digit.

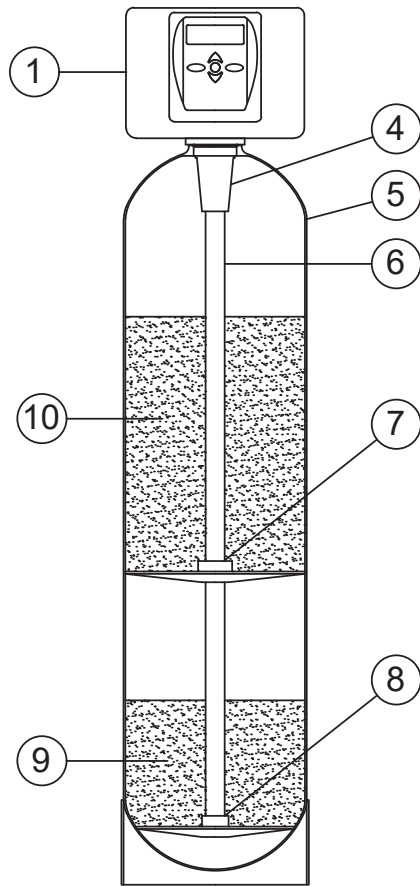


Banner Text - Set the banner text up to a maximum of 44 characters. Use the  or  to select letters of the alphabet, numbers, ampersand (&), or a space in the banner text. Press **NEXT** to forward to the next character or to exit the Installer Display Settings.

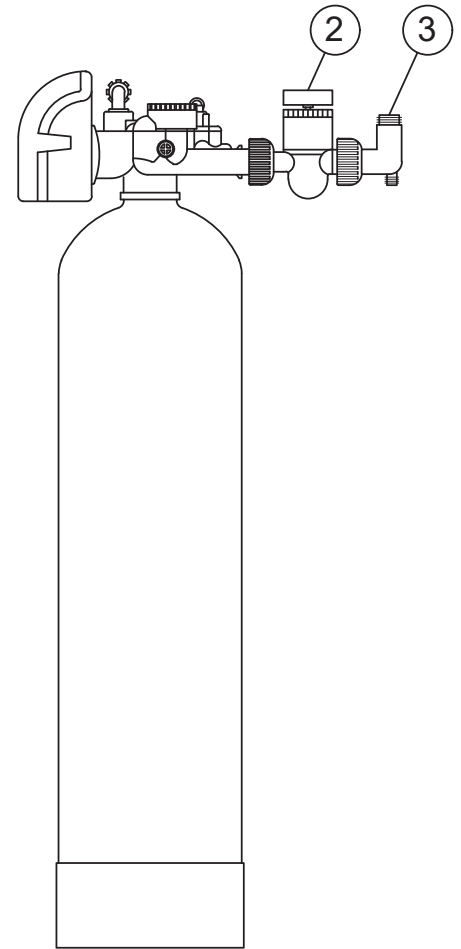
LANCASTER TANNIN SOFTENER MODEL 7-LXTAN-100B



OUTLET SIDE VIEW



FRONT VIEW

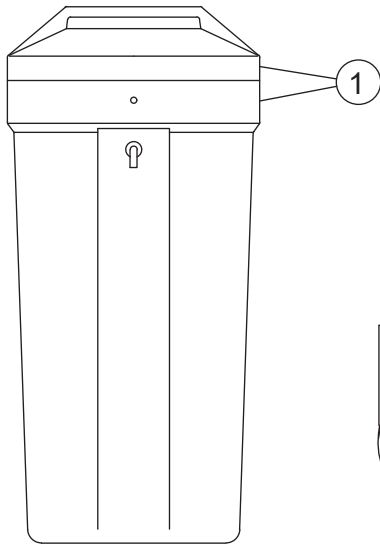


INLET SIDE VIEW

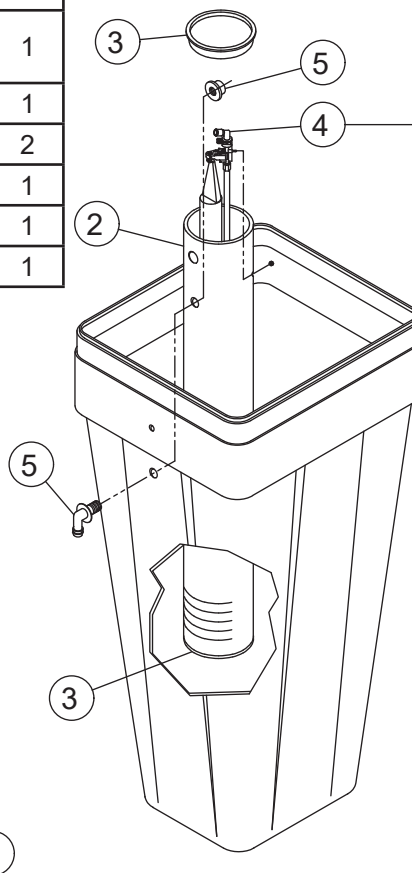
DWG. NO.	PART NUMBER AND DESCRIPTION	QTY. REQ'D.
1	LXCV1 CONTROL VALVE - DETAILED COMPONENTS ARE SHOWN ON PAGES AHEAD	1
2	BP2000 BYPASS VALVE - DETAILED COMPONENTS ARE SHOWN ON PAGES AHEAD	1
3	V3007 FITTING 1" GFPP MNPT ELBOW (V3007 = 2 FITTING ASSEMBLIES) - DETAILED COMPONENTS ARE SHOWN ON PAGES AHEAD	1
4	D1203 TOP DISTRIBUTOR	1
5,6,7,8	TANK ASSY - PPFG1060VTMO TANK, D1130-12FT DISTRIBUTOR TUBE (CUT FOR 60"), R-ADAPTERMLG MIDPLATE ADAPTER, RDIP1050 CONNECTOR	1
9	TANEX TANNIN REMOVAL ANION RESIN - QTY. SHOWN IN CU. FT. (LBS.)	0.5 (22)
10	A4074CN8 WATER SOFTENER CATION RESIN - QTY. SHOWN IN CU. FT. (LBS.)	1.0 (52)

J7952 BRINE TANK ASSEMBLY 15x17x36

Drawing No.	Order No.	Description	Qty
1	-	15x17x36 Brine Tank & Cover (not sold separately)	1
2	H1031	4x30 Slotted Brine Well	1
3	H7016	4 inch Brine Well Cap	2
4	4740	3/8" Brine Valve Assembly	1
5	H1018	Two Piece Overflow Set	1
6	H1023	3/8" O.D. x 6 Ft. Poly Tubing	1



FRONT VIEW

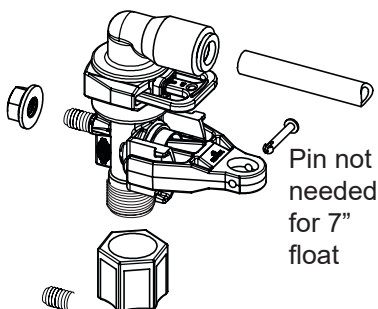


EXPLODED VIEW

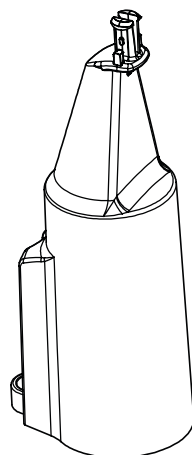


4740 ASSY COMPLETE VIEW

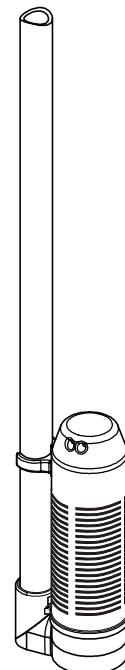
4740 Brine Valve Assembly is available only as a complete assembly, consisting of ...



Safety Brine Valve Assy



7" One Piece Float



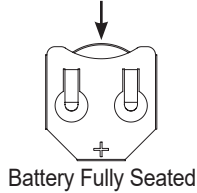
Air Check Assy with 1/2" Riser Pipe

X-FACTOR FRONT COVER AND DRIVE ASSEMBLY

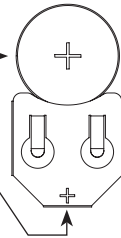
Drawing No.	Order No.	Description	Quantity
1	V3692-02LW	LP Front Cover Assembly	1
2	V3107-01	Motor	1
3	V3106-01	Drive Bracket (new design -no spring clip needed), with Drive Gear 12x36 and Drive Gear Cover attached.	1
4	V3757LP	PC Board	1

When replacing the battery, first unplug the control valve power adapter from the 120 volt receptacle. Install new battery properly (see below) and then plug the power adapter back into the receptacle to restore power. **It is important to replace the battery with the control valve unplugged to prevent the possibility of causing a short and damaging the PC Board.**

When replacing the battery, align positives and push down to fully seat.

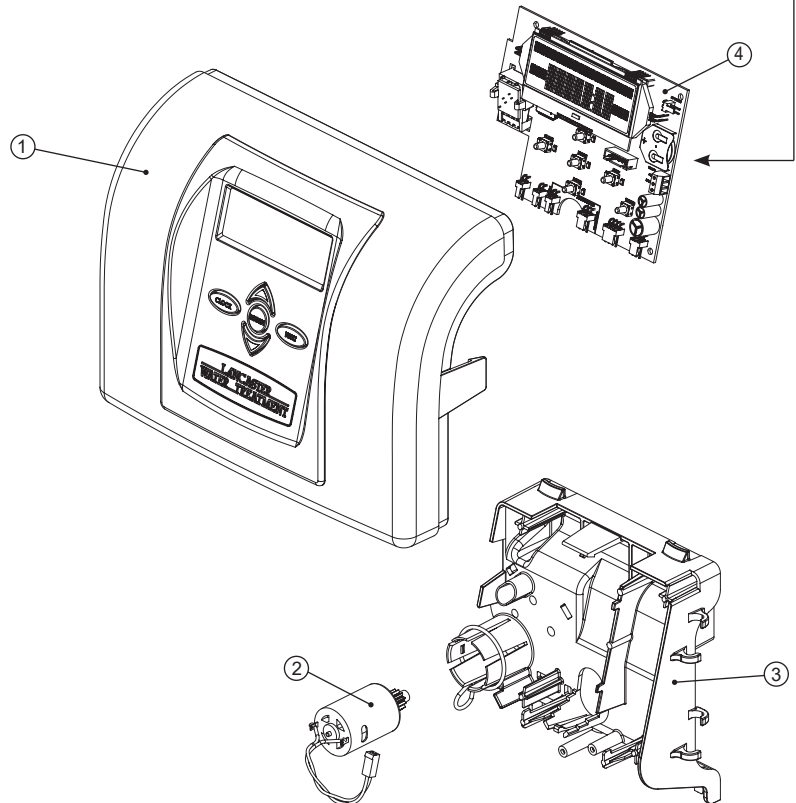


Correct
Battery
Orientation



Battery replacement is
3 volt lithium coin cell
type 2032.

AC Adapter	(Not shown)
Order No.	V3186
Supply Voltage	120V AC
Supply Frequency	60 Hz
Input Current	0.35 A
Output Voltage	15V DC
Output Current	0.5 A
No user serviceable parts are on the PC board, the motor, or the power adapter. The means of disconnection from the main power supply is by unplugging the power adapter from the wall.	



After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

Refer to page 25 for detailed service instructions.

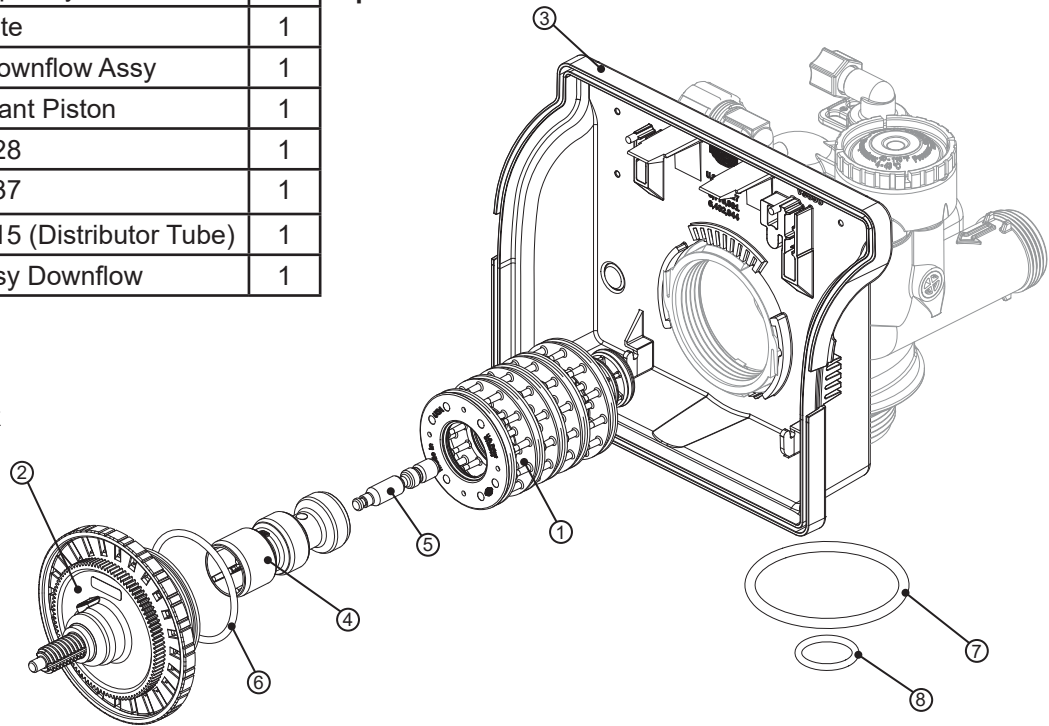
DRIVE CAP ASSEMBLY, DOWNFLOW PISTON, REGENERANT PISTON AND SPACER STACK ASSEMBLY

Drawing No.	Order No.	Description	Qty
1	V3005	Spacer Stack Assembly	1
2	V3004	Drive Cap Assy	1
3	V3178LP	Back Plate	1
4	V3011	Piston Downflow Assy	1
5	V3174	Regenerant Piston	1
6	V3135	O-ring 228	1
7	V3180	O-ring 337	1
8	V3105	O-ring 215 (Distributor Tube)	1
Not Shown	V3001	Body Assy Downflow	1

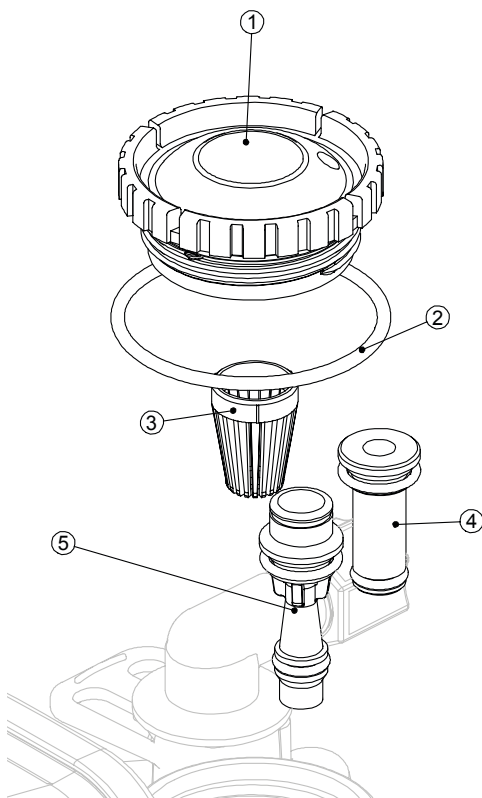
Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary. **Avoid any type of lubricants, including silicone, on the clear lip seals.**

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

Refer to page 27 and 28 for detailed service instructions.



INJECTOR CAP, INJECTOR SCREEN, INJECTOR, PLUG AND O-RING



Drawing No.	Order No.	Description	Qty
1	V3176	Injector Cap	1
2	V3152	O-ring 135	1
3	V3177-01	Injector Screen Cage	1
4	V3010-1Z	Injector Assy Z Plug	1
5	V3010-1E	Injector Assy E White	1
Not Shown	V3170	O-Ring 011	*
Not Shown	V3171	O-Ring 013	*

* The injector plug and the injector each contain one 011 (lower) and 013 (upper) o-ring.

The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench (see page 23). If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in slots on caps and/or tap with a hammer.

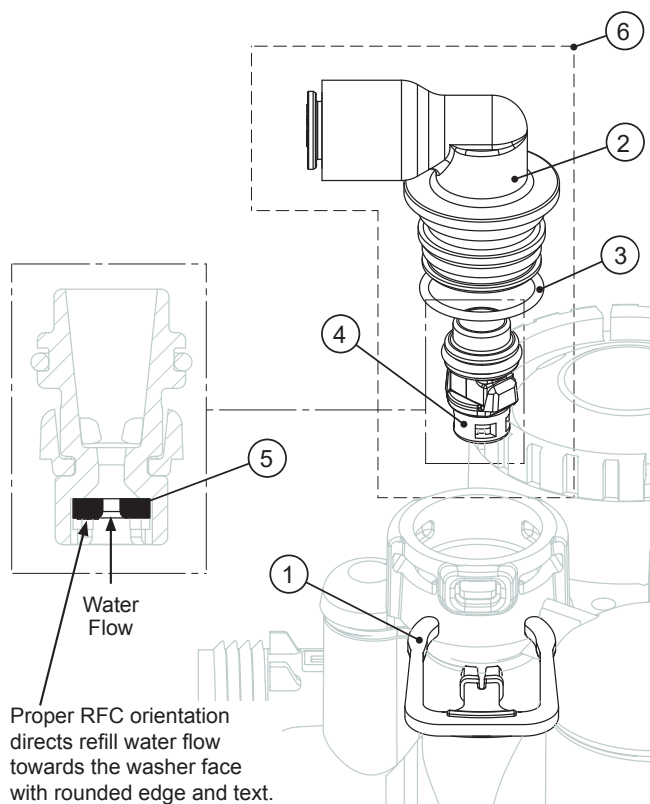
Refer to page 28 for detailed service instructions.

REFILL FLOW CONTROL ASSEMBLY

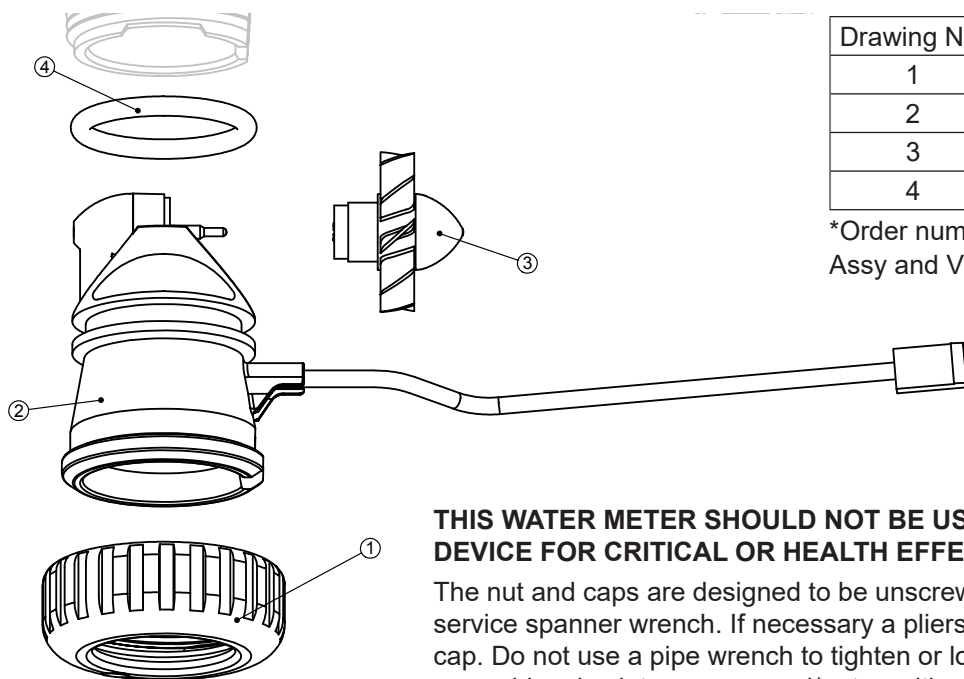
Drawing No.	Order No.	Description	Qty
1	H4615	Elbow Locking Clip	1
2	H4628	Elbow 3/8" Liquifit	1
3	V3163	O-ring 019	1
4	V3165-01*	RFC Retainer Assy (0.5 gpm)	1
5	V3182	RFC	1
6	V4144-01	Elbow 3/8 Liquifit Assy w/RFC	1

*Assembly includes V3182 RFC.

Refer to page 27 for detailed service instructions.



WATER METER



Drawing No.	Order No.	Description	Qty
1	V3151	Nut 1" QC	1
2	V3003*	Meter Assy	1
3	V3118-01	Turbine Assy	1
4	V3105	O-ring 215	1

*Order number V3003 includes V3118-01 Turbine Assy and V3105 O-ring 215.

THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.

The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in slots on caps and/or tap with a hammer.

Refer to page 28 for detailed service instructions.

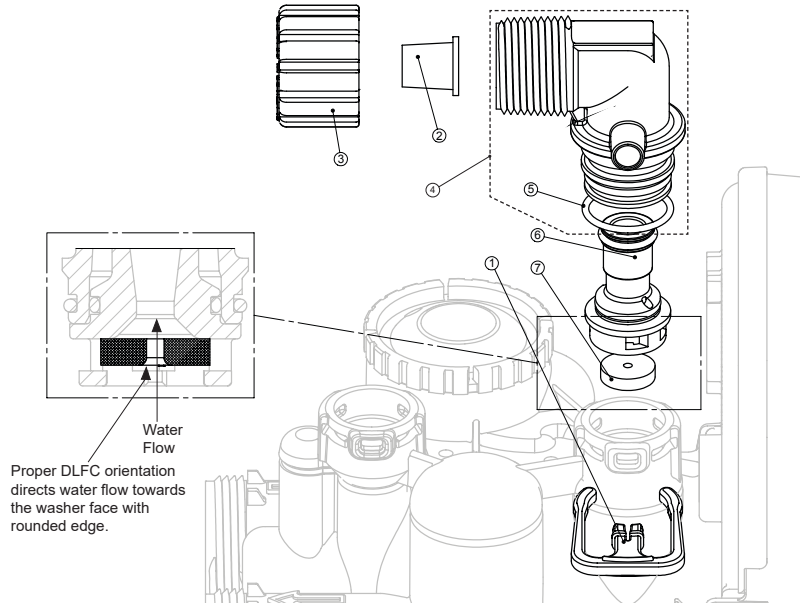
DRAIN LINE - 3/4"

Dwg No.	Order No.	Description	Qty
1	H4615	Elbow Locking Clip	1
2	V3194	Polytube insert 5/8	Option
3	V3192	Nut 3/4 Drain Elbow	Option
4*	V3158	Drain Elbow 3/4 Male	1
5	V3163	O-ring 019	1
6*	V3159	DLFC Retainer Assy	1
7	V3162-017	DLFC 1.7 gpm for 3/4	1

*4 and 6 can be ordered as a complete assembly - V3331 Drain Elbow and Retainer Assy

Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of 3/4" NPT connection (unless using 5/8" polytubing).

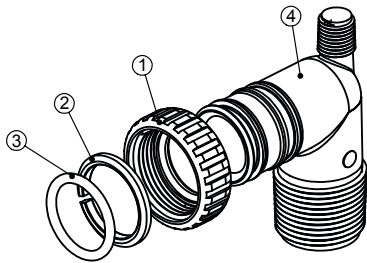
Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.



INSTALLATION FITTING ASSEMBLIES

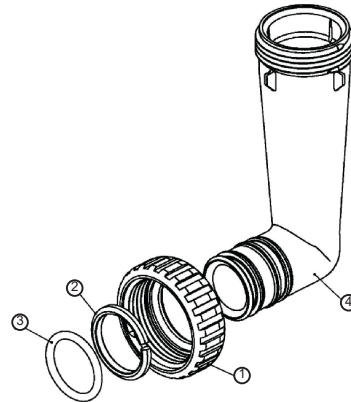
Order No: **V3007** (Standard)
Description: **Fitting 1" GFPP Male NPT Elbow Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3149	Fitting 1 GFPP Male NPT Elbow	2



Order No: **V3191-01** (Optional)
Description: **Fitting Vertical Adapter Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3191	Vertical Adapter	2



Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of 1" NPT connection. Teflon tape is not necessary on the nut connection or caps because of o-ring seals.

The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in slots on caps and/or tap with a hammer.

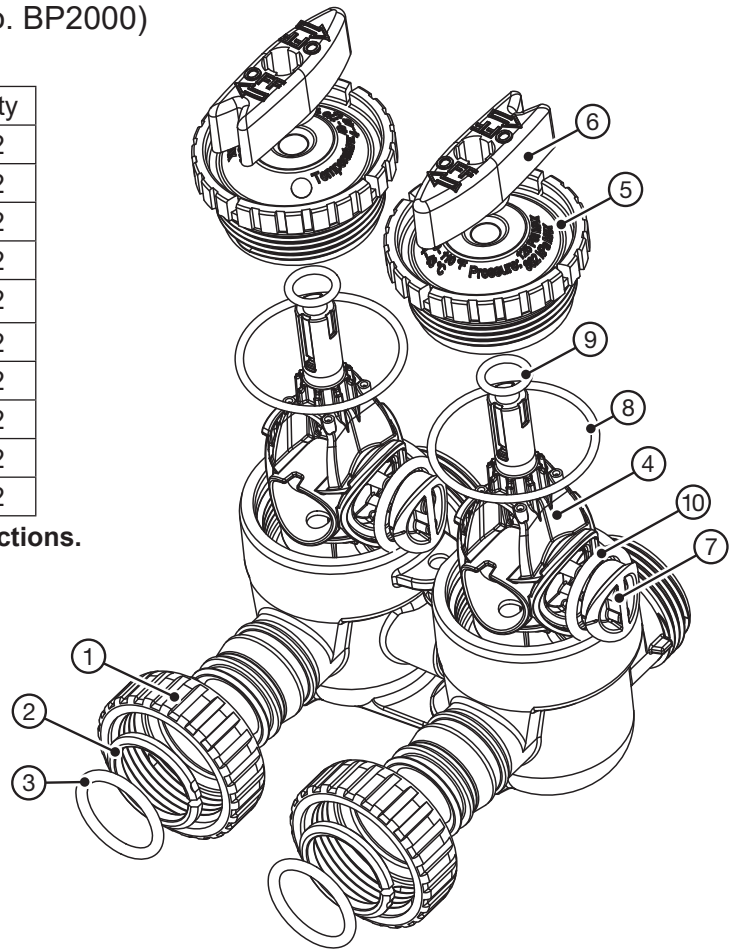
Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.

BYPASS VALVE

(Order No. BP2000)

Drawing No.	Order No.	Description	Qty
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	Bypass 1" Rotor	2
5	V3146	Bypass Cap	2
6	V3147	Bypass Handle	2
7	V3148	Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2

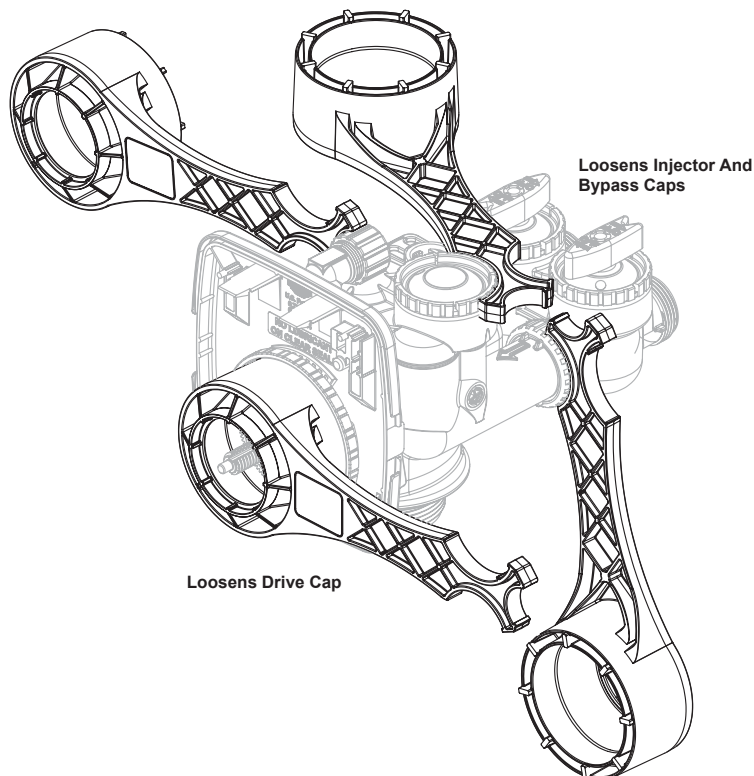
Refer to page 7 for detailed operation and service instructions.



SERVICE SPANNER WRENCH

(Order No. V3193)

Although no tools are necessary to assemble or disassemble the valve, the wrench (shown in various positions on the valve) may be purchased to aid in assembly or disassembly.

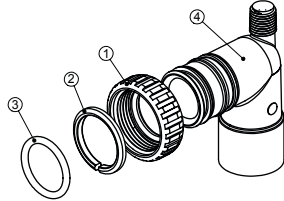


OPTIONAL INSTALLATION FITTING ASSEMBLIES

Order No: **V3007-01**

Description: **Fitting ¾" & 1" PVC Solvent 90° Assembly**

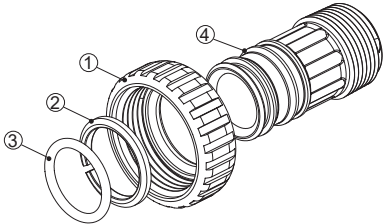
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3189	Fitting ¾&1" PVC Solvent 90	2



Order No: **V3007-04**

Description: **Fitting 1" Plastic Male NPT Assembly**

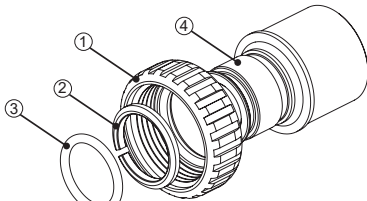
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3164	Fitting 1" Plastic Male NPT	2



Order No: **V3007-09**

Description: **Fitting 1¼" & 1½" Brass Sweat Assembly LF**

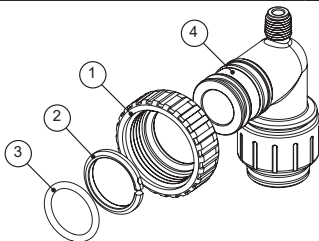
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3375	Fitting 1¼" & 1½" Brass Sweat	2



Order No: **V3007-15**

Description: **WS1 FTG 3/4 JG QC 90 Assembly**

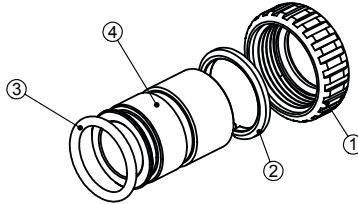
Drawing No.	Order No.	Description	Qty.
1	V3151	WS1 NUT 1 QC	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3790	WS1 ELBOW 3/4 QC W/STEM	2



Order No: **V3007-02**

Description: **Fitting 1" Brass Sweat Assembly LF**

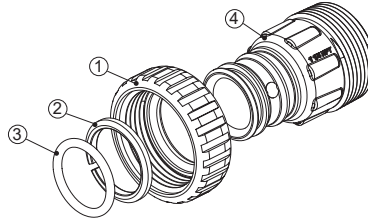
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3188	Fitting 1 Brass Sweat Assembly	2



Order No: **V3007-05**

Description: **Fitting 1-¼" Plastic Male NPT Assembly**

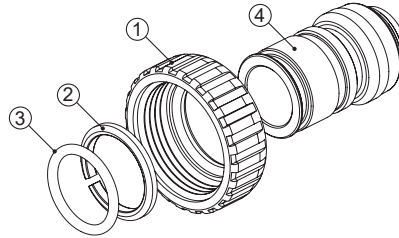
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3317	Fitting 1-¼" Plastic Male NPT	2



Order No: **V3007-12**

Description: **Fitting 3/4" Brass SharkBite Assembly LF**

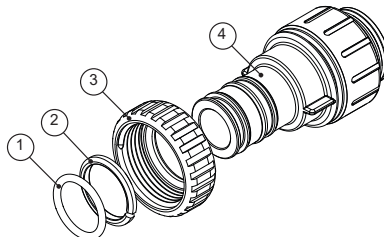
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3628	Ftg 3/4 Brass Shark-Bite	2



Order No: **V3007-17**

Description: **WS1 FTG 1" JG QC Assembly**

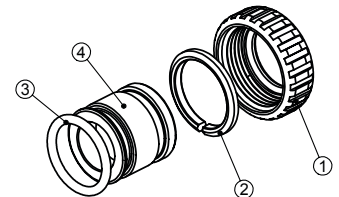
Drawing No.	Order No.	Description	Qty.
1	V3105	O-RING 215	2
2	V3150	WS1 SPLIT RING	2
3	V3151	WS1 NUT 1 QC	2
4	V4045	WS1 FTG 1 INCH QC	2



Order No: **V3007-03**

Description: **Fitting ¾" Brass Sweat Assembly LF**

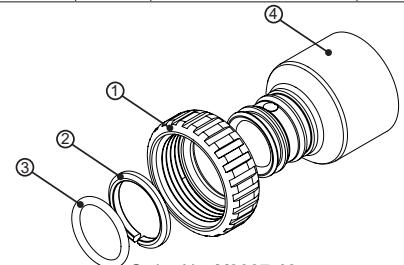
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3188-01	Fitting ¾ Brass Sweat	2



Order No: **V3007-07**

Description: **Fitting 1¼" & 1½" PVC Solvent Assembly**

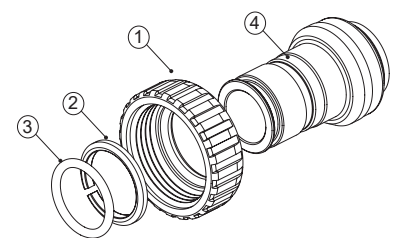
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3352	Fitting 1¼&1½" PVC Solvent	2



Order No: **V3007-13**

Description: **Fitting 1" Brass SharkBite Assembly LF**

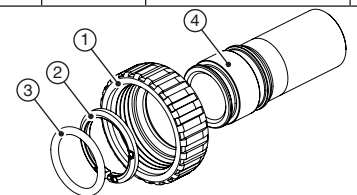
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3629	Ftg 1" Brass Shark-Bite	2



Order No: **V3007-22**

Description: **WS1 Fitting 1" Brass Press/Sweat Asy LF**

Drawing No.	Order No.	Description	Qty.
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V4318-LF	WS1 Fitting 1 Brass Press/Sweat LF	2



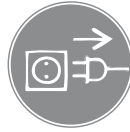
CONTROL VALVE SERVICE INSTRUCTIONS



CAUTION: Never perform service on an installed softener control valve unless pressure is fully relieved from the softener system. Injury and/or flooding can occur.



When servicing the valve, water may leak from the valve. Water from the valve may create a slip hazard. Clean up water spills.



Disconnect from electrical power prior to servicing the valve.

DRIVE ASSEMBLY (refer to pages 19&20 for diagrams):

Remove the valve cover to access the drive assembly.

Disconnect the power source plug from the PC board prior to disconnecting the motor or water meter plugs from the PC board. The power source plug connects to the four-pin jack. The motor plug connects to the two-pin jack on the left-hand side of the PC board. The water meter plug (gray wire) connects to the three-pin jack on the far right-hand side of the PC board.

The PC board can be removed separately from the drive bracket but it is not recommended. Do not attempt to remove the display panel from the PC board. Handle the board by the edges. To remove the PC board from the drive bracket, unplug the power, water meter and motor plugs from the PC board. Lift the middle latch along the top of the drive bracket while pulling outward on the top of the PC board. The drive bracket has two plastic pins that fit into the holes on the lower edge of the PC board. Once the PC board is tilted about 45° from the drive bracket it can be lifted off of these pins. To reinstall the PC board, position the lower edge of the PC board so that the holes in the PC board line up with the plastic pins. Push the top of the PC board towards the valve until it snaps under the middle latch, weave the power and water meter wires into the holders and reconnect the motor, water meter and power plugs.

The drive bracket must be removed to access the drive cap assembly and pistons or the drive gear cover. It is not necessary to remove the PC board from the drive bracket to remove the drive bracket. To remove the drive bracket start by removing the plugs for the power source and the water meter. Unweave the wires from the side holders. Two tabs on the top of the drive back plate hold the drive bracket in place. Simultaneously lift the two tabs and gently ease the top of the drive bracket forward. The lower edge of the drive bracket has two notches that rest on the drive back plate. Lift up and outward on the drive bracket to disengage the notches.

To reassemble, seat the bottom of the drive bracket so the notches are engaged at the bottom of the drive back plate. Push the top of the drive bracket toward the two latches. The drive bracket may have to be lifted slightly to let the threaded piston rod pass through the hole in the drive bracket. Maintain a slight engaging force on top of the drive bracket while deflecting the bracket slightly to the left by pressing on the side of the upper right corner. This helps the drive gears mesh with the drive cap assembly. The drive bracket is properly seated when it snaps under the latches on the drive back plate. If resistance is felt before latching, then notches are not fully engaged, the piston rod is not in hole, the wires are jammed between the drive bracket and drive back plate, or the gear is not engaging the drive cap assembly.

To inspect the drive gears, the drive gear cover needs to be removed. Before trying to remove the gear cover, the drive bracket must be removed from the drive back plate. (Refer to the instructions above regarding removing the drive bracket from the drive back plate. The drive gear cover can be removed from the drive bracket without removing the motor or the PC board.) The drive gear cover is held in place on the drive bracket by three clips. The largest of the three clips is always orientated to the bottom of the drive bracket. With the PC board facing up, push in and down on the large clip on the drive gear cover. Handle the cover and the gears carefully so that the gears do not fall off the pegs in the cover.

Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt or oils may interfere with pulse counting.

The drive gear cover only fits on one way, with the large clip orientated towards the bottom. If all three clips are outside of the gear shroud on the drive bracket the drive gear cover slips easily into place.

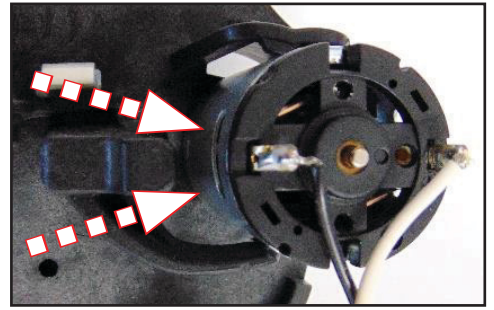
The drive bracket does not need to be removed from the drive plate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the jacks on the PC board. Replace the motor if necessary. Do not lubricate the motor or the gears. See the next page for instructions for removing and reinstalling the motor on the new drive bracket design (no spring clip needed). After the motor is reinstalled, reconnect the motor plug to the two-pronged jack on the lower left side of the PC board. Reconnect the power plug.

Replace the valve cover. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board and plug back in or press and hold  and  buttons for 3 seconds.

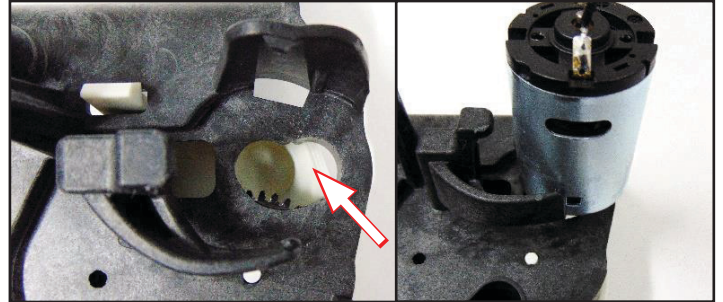
This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

MOTOR REMOVAL & INSTALLATION INSTRUCTIONS

1. When removing the motor, push the motor from the bottom and top side of the retaining clip straight out and away from the locking tab and pull the motor up and out of the drive bracket.



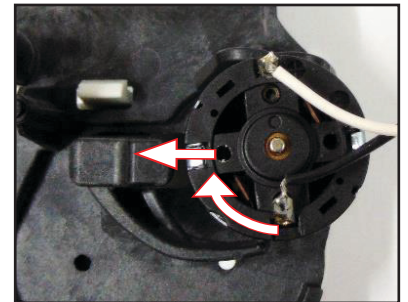
2. When installing the motor, place the motor gear side down into the end of the slot in the drive bracket furthest away from the locking tab. Ensure the holes in the motor housing are a quarter-turn away from the locking tab.



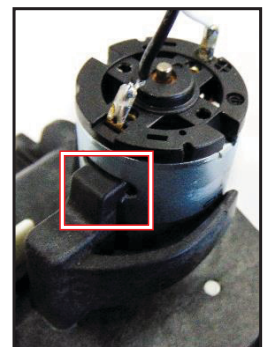
3. Ensure the motor is flush with the drive bracket before proceeding.



4. Gently rotate the motor clockwise (to the right) while pushing the motor towards the locking tab. The motor will engage the gears in the drive bracket while sliding into place.

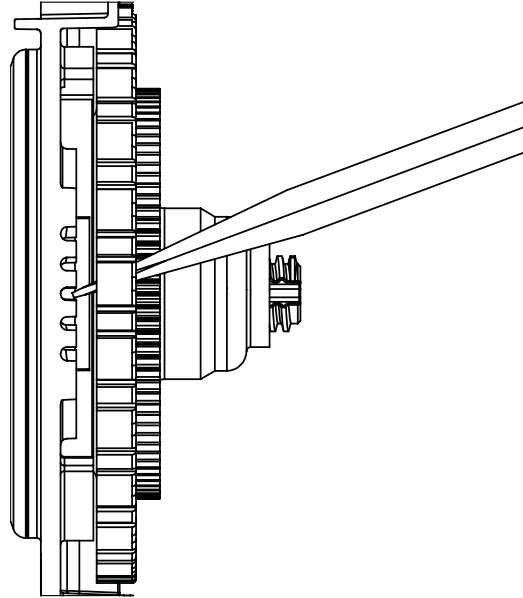


4. Ensure the locking tab on the drive bracket is fully inserted into one of the holes in the motor housing.



DRIVE CAP ASSEMBLY, MAIN PISTON AND REGENERANT PISTON (refer to pages 19&20 for diagrams):

The drive assembly must be removed to access the drive cap assembly. The drive cap assembly must be removed to access the piston(s). The drive cap assembly is threaded into the control valve body and seals with an o-ring. To remove the drive cap assembly use the special plastic service spanner wrench (see page 23) or insert a ¼" to ½" flat blade screwdriver into one of the slots around the top 2" of the drive cap assembly so it engages the notches molded into the drive back plate around the top 2" of the piston cavity. See figure below. The notches are visible through the holes. Lever the screwdriver so the drive cap assembly turns counter clockwise. Once loosened unscrew the drive cap assembly by hand and pull straight out.



The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod and various other parts that should not be disassembled in the field. The only replaceable part on the drive cap assembly is the o-ring. Attached to the drive cap assembly is the main piston and a regenerant piston.

The regenerant piston (the small diameter one behind the main piston) is removed from the main piston by pressing sideways and unsnapping it from its latch. Chemically clean in dilute sodium bisulfite or vinegar, or replace the regenerant piston if needed. To remove the main piston fully extend the piston rod and then unsnap the main piston from its latch by pressing on the side with the number. Chemically clean in dilute sodium bisulfite or vinegar, or replace the main piston.

Reattach the main piston to the drive cap assembly. Reattach the regenerant piston (if needed) to the main piston. Reinsert the drive cap assembly and piston into the spacer stack assembly and hand tighten the drive cap assembly. Continue to tighten the drive cap assembly using a screwdriver as a ratchet until the black o-ring on the spacer stack assembly is no longer visible through the drain port. Excessive force can break the notches molded into the drive back plate. Make certain that the main drive gear still turns freely. The exact position of the piston is not important as long as the main drive gear turns freely.

Reattach the drive assembly to the control valve and connect all plugs. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds.

This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

REFILL FLOW CONTROL ASSEMBLY (refer to page 21 for diagrams):

To clean or replace the refill flow control, pull out the elbow-locking clip and then pull straight up on the elbow. Replace the elbow locking clip in the slot so that it is not misplaced. Twist to remove the white flow control retainer. The flow control can be removed by prying upward through the side slots of the retainer with a small flat blade screwdriver.

Chemically clean the flow control or the white flow control retainer using dilute sodium bisulfite or vinegar. Do not use a wire brush. If necessary, replace the flow control, o-ring on the flow control retainer, or the o-ring on the elbow.

Reset the flow control so the rounded end is visible in the flow control. Reset the white flow control retainer by pushing the retainer into the elbow until the o-ring seats. Remove locking clip, push down on elbow to reset and insert locking clip.

Do not use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicone lubricant may be used on the o-ring on the elbow or the white retainer.

SPACER STACK ASSEMBLY (refer to pages 19&20 for diagrams):

To access the spacer stack assembly remove the drive assembly, drive cap assembly and piston. The spacer stack assembly can be removed easily without tools by using thumb and forefinger. Inspect the black o-rings and clear lip seals for wear or damage. Replace the entire stack if necessary. Do not disassemble the stack.

The spacer stack assembly may be chemically cleaned (dilute sodium bisulfite or vinegar) or wiped with a soft cloth.

The spacer stack assembly can be pushed into the control valve body bore by hand. Since the spacer stack assembly can be compressed it is easier to use a blunt object (5/8" to 1-1/8" in diameter) to push the center of the assembly into the control valve body. The assembly is properly seated when at least four threads are exposed (approximately 5/8"). Do not force the spacer stack assembly in. The control valve body bore interior can be lubricated with silicone to allow for easy insertion of the entire stack.

Reattach the drive cap assembly and piston(s) and the drive assembly.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold  and  buttons for 3 seconds.

This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

INJECTOR CAP, SCREEN, INJECTOR PLUG AND INJECTOR (refer to page 20 for diagram):

Unscrew the injector cap and lift off. Loosen cap with special plastic service spanner wrench (see page 23) or pliers if necessary. Attached to the injector cap is a screen. Remove the screen and clean if fouled.

The plug and/or injector can be pried out with a small screwdriver. The plug can be wiped clean. If the plug leaks replace the entire plug. The injector consists of a throat and a nozzle. Chemically clean the injector with vinegar or sodium bisulfite. The holes can be blown out with air. Both pieces have small diameter holes that control the flow rates of water to insure that the proper concentration of regenerant is used. Sharp objects, which can score the plastic, should not be used to clean the injector. Scoring the injector or increasing the diameter of the hole could change the operating parameters of the injector.

Push the plug in the hole marked "UP" and the injector the hole marked "DN". Replace the screen and hand tighten the injector cap.

WATER METER (refer to pages 19, 20 & 21 for diagrams):

The water meter assembly is connected to the PC board by a wire. If the entire water meter assembly is to be replaced, remove the control valve cover and disconnect the power source and water meter plugs from the PC board. Unlatch the drive assembly and lean it forward. Unthread the water meter wire from the side of the drive assembly and through the drive back plate. To reinstall, rethread the water meter wire through the drive back plate and the side of the drive assembly. Reattach the drive assembly and the water meter and power plugs.

THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.

If no water meter wire is visible, then a plug is installed, not a water meter.

The water meter wire does not need to be removed from the PC board if the water meter is only being inspected and cleaned. To remove the water meter assembly, unscrew the meter cap on the left side of the control valve. Pliers may be used to unscrew the nut if necessary.

With the nut removed, a slot at the top of the water meter is visible. Twist a flat blade screwdriver in the slot between the control valve body and the meter. When the meter is part way out it is easy to remove the water meter from the housing. Once the water meter is removed from the control valve body, gently pull forward on the turbine to remove it from the shaft.

Do not use a wire brush to clean the turbine. Wipe with a clean cloth or chemically clean in dilute sodium bisulfite or vinegar. The turbine can be immersed in the chemical. Do not immerse electronics. If the turbine is scored or damaged or the bearings on the turbine are worn, replace the turbine.

Do not lubricate the turbine shaft. The turbine shaft bearings are prelubricated. Do not use Vaseline, oils, or other unacceptable lubricants on the o-ring. A silicone lubricant may be used on the black o-ring.

Snap the turbine on the shaft and reinsert the water meter into the side slot. Hand tighten the nut. Do not use a pipe wrench to tighten nut.

TROUBLESHOOTING

Problem	Possible Cause	Solution
1. No Display on PC Board	a. No power at electric outlet	a. Repair outlet or use working outlet
	b. Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	b. Plug Power Adapter into outlet or connect power cord end to PC Board connection
	c. Improper power supply	c. Verify proper voltage is being delivered to PC Board
	d. Defective Power Adapter	d. Replace Power Adapter
	e. Defective PC Board	e. Replace PC Board
2. PC Board does not display correct time of day	a. Power Adapter plugged into electric outlet controlled by light switch	a. Use uninterrupted outlet
	b. Tripped breaker switch and/or tripped GFI	b. Reset breaker switch and/ or GFI switch
	c. Power outage	c. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	d. Defective PC Board	d. Replace PC Board
3. Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Meter is not connected to meter connection on PC Board	b. Connect meter to three pin connection labeled METER on PC Board
	c. Restricted/ stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Meter wire not installed securely into three pin connector	d. Verify meter cable wires are installed securely into three pin connector labeled METER
	e. Defective meter	e. Replace meter
	f. Defective PC Board	f. Replace PC Board
4. Control valve regenerates at wrong time of day	a. Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration set incorrectly	c. Reset regeneration time
	d. Control valve set at immediate regeneration	d. Check programming setting and reset to DELAYED (for a delayed regen time)
	e. Control valve set at (delayed + immediate)	e. Check programming setting and reset to DELAYED (for a delayed regen time)
5. Time of day flashes on and off	a. Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
6. Control valve does not regenerate automatically when the REGEN button is depressed	a. Broken drive gear or drive cap assembly	a. Replace drive gear or drive cap assembly
	b. Broken Piston Rod	b. Replace piston rod
	c. Defective PC Board	c. Replace PC Board
7. Control valve does not regenerate automatically but does when the REGEN button is depressed and held.	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Meter is not connected to meter connection on PC Board	b. Connect meter to three pin connection labeled METER on PC Board
	c. Restricted/ stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Incorrect programming	d. Check for programming error
	e. Meter wire not installed securely into three pin connector	e. Verify meter cable wires are installed securely into three pin connector labeled METER
	f. Defective meter	f. Replace meter
	g. Defective PC Board	g. Replace PC Board

Problem	Possible Cause	Solution
8. Hard or untreated water is being delivered	a. Bypass valve is open or faulty	a. Fully close bypass valve or replace
	b. Media is exhausted due to high water usage	b. Check program settings or diagnostics for abnormal water usage
	c. Meter not registering	c. Remove meter and check for rotation or foreign material
	d. Water quality fluctuation	d. Test water and adjust program values accordingly
	e. No regenerant or low level of regenerant in regenerant tank	e. Add proper regenerant to tank
	f. Control fails to draw in regenerant	f. Refer to Trouble Shooting Guide number 12
	g. Insufficient regenerant level in regenerant tank	g. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
	h. Damaged seal/stack assembly	h. Replace seal/stack assembly
	i. Control valve body type and piston type mix matched	i. Verify proper control valve body type and piston type match
	j. Fouled media bed	j. Replace media bed
9. Control valve uses too much regenerant	a. Improper refill setting	a. Check refill setting
	b. Improper program settings	b. Check program setting to make sure they are specific to the water quality and application needs
	c. Control valve regenerates frequently	c. Check for leaking fixtures that may be exhausting capacity or system is undersized
10. Residual regenerant being delivered to service	a. Low incoming water pressure	a. Check pressure – must remain at minimum of 20 psi. If possible, increase pump switch cut-in to 25 psi.
	b. Incorrect injector size	b. Replace injector with correct size for the application
	c. Restricted drain line	c. Check drain line for restrictions or debris and clean
11. Excessive water in regenerant tank	a. Improper program settings	a. Check refill setting
	b. Plugged injector	b. Remove injector and clean or replace
	c. Drive cap assembly not tightened in properly	c. Re-tighten the drive cap assembly
	d. Damaged seal/ stack assembly	d. Replace seal/ stack
	e. Restricted or kinked drain line	e. Check drain line for restrictions or debris and or un-kink drain line
	f. Plugged backwash flow controller	f. Remove backwash flow controller and clean or replace
	g. Missing refill flow controller	g. Replace refill flow controller
12. Control valve fails to draw in regenerant	a. Injector is plugged	a. Remove injector and clean or replace
	b. Faulty regenerant piston	b. Replace regenerant piston
	c. Regenerant line connection leak	c. Inspect regenerant line for air leak
	d. Drain line restriction or debris cause excess back pressure	d. Inspect drain line and clean to correct restriction
	e. Drain line too long or too high	e. Shorten length and or height
	f. Low incoming water pressure	f. Check pressure – must remain at minimum of 20 psi. If possible, increase pump switch cut-in to 25 psi.
13. Water running to drain	a. Power outage during regeneration	a. Upon power being restored control will finish the remaining regeneration time. Reset time of day
	b. Damaged seal/ stack assembly	b. Replace seal/ stack assembly
	c. Piston assembly failure	c. Replace piston assembly
	d. Drive cap assembly not tightened in properly	d. Re-tighten the drive cap assembly

Problem	Possible Cause	Solution
14. Error – 101 = Control unable to sense motor movement	a. Motor not inserted full to engage pinion, motor wires broken or disconnected	a. Disconnect power, make sure motor is fully engaged, check for broken wires, make sure two pin connector on motor is connected to the two pin connection on the PC Board labeled MOTOR. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. PC Board not properly snapped into drive bracket	b. Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Missing reduction gears	c. Replace missing gears
15. Error – 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled	a. Foreign material is lodged in control valve	a. Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Mechanical binding	b. Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Main drive gear too tight	c. Loosen main drive gear. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	d. Improper voltage being delivered to PC Board	d. Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
16. Error – 103 = Control valve motor ran too long and was unable to find the next cycle position	a. Motor failure during a regeneration	a. Check motor connections then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	b. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	c. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.

Problem	Possible Cause	Solution
17. Error – 104 = Control valve motor ran too long and timed out trying to reach home position	a. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	a. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
18. Error -106 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	a. Control valve programmed for ALT A or B, nHbP, SEPS, or AUX MAV with out having a MAV or NHBP valve attached to operate that function	a. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. Then re-program valve to proper setting
	b. MAV/ NHBP motor wire not connected to PC Board	b. Connect MAV/ NHBP motor to PC Board two pin connection labeled MAV MTR. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. MAV/ NHBP motor not fully engaged with reduction gears	c. Properly insert motor into casing, do not force into casing. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	d. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	d. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
19. Error – 107 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	a. Foreign material is lodged in MAV/ NHBP valve	a. Open up MAV/ NHBP valve and check piston and seal/ stack assembly for foreign material. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Mechanical binding	b. Check piston and seal/ stack assembly, check reduction gears, drive gear interface, and check MAV/ NHBP black drive pinion on motor for being jammed into motor body. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.



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